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ISIS

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The Algebra of Nārāyaṇa

Nārāyaṇa's Time and Place

There had been several Hindu writers of the name of NĀRĀYAṆA (1). Four of those who wrote on secular sciences attained some distinction (2). Amongst these again the earliest and by far the most important scholar, an eminent mathematician, with whom we are concerned here, was the son of NṚSIṀHA (or NARASIṀHA) and flourished about the middle of the fourteenth century of the Christian era. Others wrote mostly on astronomy and astrology. The next in age and celebrity was NĀRĀYAṆA, the son of ANANTA, an inhabitant of the village Tapar, near Devagiri (modern Daulatabad). He wrote (in 1571 A.D.) a well known astrological treatise, the *Mūhurta-mārtaṇḍa* or " The sun of divisions of time", together with its gloss, *Mārtaṇḍa-vallabha* by name (1572). ANANTA is noted for his tables for the calculation of almanacs according to the system of the *Sūrya-siddhānta*. NĀRĀYAṆA's son, GAṄGĀDHARA, is the author of a commentary (written in 1586) on the celebrated treatise on practical astronomy, the *Graha-lāghava* of GAṆEŚA. NĀRĀYAṆA III, the son of GOVINDA, belonged to a family which produced a galaxy of eminent mathematicians, astronomers and astrologers. His uncle KṚṢṆA was the Astronomer Royal in the Court of the Emperor JEHANGIR of Delhi (1605-1628). But his fame rests more on his excellent commentary on the algebra of BHĀSKARA II. Another uncle RAṆGANĀTHA wrote (in 1603) what is universally admitted to be the best known commentary on the *Sūrya-siddhānta*. NĀRĀYAṆA's nephew, MUNĪŚVARA, is the author of

(1) Vide T. AUFRECHT, *Catalogus Catalogorum*, Leipzig, 1892, pp. 288 ff.

(2) S. B. DIKSHIT, *History of Indian Astronomy*, Poona, 1896, pp. 252, 272, 284, 292.

several treatises on mathematics and astronomy. NĀRĀYAṆA wrote (in 1617) a commentary on the astrological treatise, *Jātaka-paddhati* by name, of KEŚAVA. By confusion of names SUDHAKARA DVIVEDI (3) attributed to him the authorship of a treatise on algebra which is really the work of our author. A colophon in that treatise to the effect that the author is the son of NARASIṀHA can leave indeed absolutely no doubt whatsoever in the matter. NĀRĀYAṆA IV, the son of DĀDĀBHAṬA, flourished in the first half of the eighteenth century and wrote several treatises on astrology.

Returning to our author, we do not know the part of India which he belonged to. He was born in an age of decadence for Hindu scientific culture in general. Some two hundred years before him, political power of Hindustan passed into the hands of Muhammadan invaders from the north-west who were not only unsympathetic but oftentimes positively hostile to indigenous ideals and culture. The old learning was "put down and persecuted by the political power flushed with its first victories, and we have harrowing tales of old Universities broken up, libraries looted and the votaries of indigenous learning, Hindu or Buddhist, murdered or driven away homeless." (4) When this fervor of fanaticism and religious bigotry began to subside —it never, indeed, disappeared completely during the whole of the Muslim rule of seven hundred years, except occasionally for a short period—there appeared now and then rulers and noblemen who encouraged learning, established schools, colleges and libraries, and created endowments for the support of the literary men. But those institutions were centres of Islamic culture of meagre quality and mostly theological. They drew their inspiration from foreign sources, and even requisitioned services of teachers from Persia, Arabia and Turkistan. The medium of instruction was Persian or Urdu. The teaching of Hindu science and literature found no place there. They were left to the care and support of the Hindu mass, landholders and petty chiefs. What encouragement to original thinking and advanced learning in science and to the spread of scientific ideas could be expected

(3) SUDHAKARA DVIVEDI, *Gaṇaka-Taraṅgiṇī*, Benares, 1892, p. 85.

(4) NARENDRA NATH LAW, *Promotion of Learning in India during the Muhammadan rule (by Muhammadans)*, London, 1916, Preliminary, pp. XLV *sqq*.

from people of those classes in such times? Amidst such uncongenial surroundings Hindu astronomy rapidly degenerated into the art of calendar-making, and Hindu mathematics survived as a handmaid to that. Only astrology and palmistry seem to have gained some favour in the courts of the kings and noblemen. There were born particularly in the southern part of the country which was comparatively less swayed by Muhammadan influence, some commentators of more or less note who contributed little original but helped to keep alive those ancient treatises which escaped Muhammadan vandalism, by creating an interest of the votaries of Hindu learning in them by their observations and explanations. Very few treatises of standard quality were composed. Our author was particularly fortunate as he got time for respite and peaceful investigation owing to the end of the cruel and whimsical Emperor MUHAMMAD TUGHLAQ (1328-1351) and his succession by a good and liberal administrator, FIRUZ SHAH (1351-1388) a great patron of learning and " perhaps, the best of the Muhammadan emperors of India."

Nārāyaṇa's Works

NĀRĀYAṆA is the author of two works: (1) an arithmetical treatise, the *Gaṇita-pāṭi-Kaumudī* or simply the *Gaṇita-Kaumudī* (or " Elucidation of Arithmetic ") and (2) a treatise on algebra, the *Bīja-gaṇitāvataṁsa* (or " Ornament of Algebras "), which is the subject of this paper. He is said to have also written a commentary on the *Līlāvatī* of BHĀSKARA II (5). But we are not sure of it. In the collection of the Government Oriental Manuscripts Library in Madras, is found a manuscript (No. 13484) of a commentary on the *Līlāvatī*, *Karma-pradīpikā* by name, by one NĀRĀYAṆA (6). But there is nothing to identify that writer with our author. On the other hand the form of the colophon of that commentary which is quite different from the form occurring in the *Gaṇita-Kaumudī* and *Bījagaṇitāvataṁsa*,

(5) DIKSHIT, *loc. cit.*, p. 252.

(6) S. KUPPUSVAMI SASTRI, *A Descriptive Catalogue of the Sanskrit Manuscripts in The Government Oriental Manuscripts Library, Mardas*, Vol. XXIV, *Jyautiṣa*, Madras, 1918.

will lead one to suspect any such presumption. It has been stated by NĀRĀYAṆA at the end of his *Gaṇita-Kaumudī* (7) that the book was completed in the Śaka year 1278 which corresponds to 1356 A.D. From a cross-reference (8) in this work we learn that NĀRĀYAṆA wrote his treatise on algebra before that date. At present we cannot be more exact about the date of composition of the *Bījagaṇitāvataṁsa*. We could have expected to find it at the end of the work itself. But the only copy of its manuscript which is so far known to exist (Ms. No. 2298 in the collection of the Sanskrit College, Benares) unfortunately breaks off abruptly after an illustrative example on the simple equation. We shall, however, assign it tentatively to *circa* 1350 A.D.

Nārāyaṇa's Sources

NĀRĀYAṆA has not mentioned the sources that he made use of in writing his algebra, though here and there he has spoken in a very general way of the rules of his " predecessors." The portion of the book that is still preserved contains only one quotation from " an earlier writer," without mention of any name. It is as follows : " In this number *Khahara* (or " infinity ") there is no change even if many numbers be added or subtracted; as no alteration takes place in the infinite and immutable God at the period of destruction or creation of the world though numerous beings are absorbed or put forth." (9) This passage is from the algebra of BHĀSKARA II (10). There are a few examples common to the two books : viz :

(1) $8x^2 + 1 = y^2$, (2) $11x^2 + 1 = y^2$, (3) $13x^2 - 1 = y^2$.

From these, as also from the similarity in the treatment of some other topics, it appears that NĀRĀYAṆA had before him the great

(7) The *Gaṇita-Kaumudī* is being published by the Sanskrit College, Benares, under the editorship of PADMAKARA DVIVEDI. The relevant statement will be found in the *Catalogue of the Sanskrit Manuscripts in the Library of the India Office, London* by E. WINDISCH & J. EGGELING, Part IV, 1894, p. 1024 (Ms. No. 2883).

(8) *Gaṇita-Kaumudī*, p. 13.

(9) *Bījagaṇitāvataṁsa*, I, Rule 15.

(10) *Bījagaṇita* of BHĀSKARA II, edited by SUDHAKARA DVIVEDI and MURALIDHARA JHA, Benares, 1927, p. 6.

Hindu classic on algebra, the *Bījagaṇita* of BHĀSKARA II (born 1115).

Nārāyaṇa's Influence

The authority of the algebra of NĀRĀYAṆA has been acknowledged by the posterior Hindu mathematicians without any reservation whatsoever. JÑĀNARĀJA (1503) has referred the readers of his algebra to it along with the algebra of BHĀSKARA II for the advanced treatment of the subjects. His son SŪRYADĀSA (1540) has quoted it on several occasions. NĀRĀYAṆA is mentioned with great respect by GAṆEŚA (1545) and others. In justification of BHĀSKARA's action in including into his treatise on arithmetic the treatment of topics such as the solution of the quadratic equation, simple indeterminate equation, quadratic double equations, etc. which properly belong to the domain of algebra, GAṆEŚA cites the instance of the similar practice of NĀRĀYAṆA and ŚRĪDHARA. He adds further that NĀRĀYAṆA has treated in the same way in his treatise on arithmetic the algebraical subjects of magic squares and combinations. This will give a clear idea of the influence which NĀRĀYAṆA exerted over other writers.

The Algebra

General Features.—NĀRĀYAṆA has divided his treatise on algebra broadly into two parts. The first part is devoted to the treatment of what have been called by BHĀSKARA II " the instruments of analysis," namely, laws of signs, arithmetic of zero, operations with unknowns, surds, pulveriser (or indeterminate analysis of the first degree), the square-nature (or the so-called Pellian equation) and the cyclic method. The second part deals with analysis proper, that is, the solution of equations. Numbering of the verses is different in the two parts. Again in each part the rules and the illustrative examples have been numbered separately. The space alloted to the treatment of each topic will be seen from the following synopsis of the work, where the numbers indicate the verses :

PART I	Rules	Examples
Salutation	1—6	
Laws of signs	7—10	1—5
Arithmetic of zero	11—16	6—8
Operations with unknowns	17—24	9—14
Surds	25—52	15—24
Pulveriser	53—71	25—35
Square-nature	72—78	36
Cyclic method	79—87	37—44
Approximate value of a surd	88	45
PART II		
Salutation	1	
Four kinds of analysis	2	
Simple equations	3—7	1—(Ms. breaks up here)

Notation.—NĀRĀYAṆA had before him two systems of notations for representing the unknowns by means of (1) the letters of the alphabet and (2) the names of various colours, both of which are as old as the beginning of the seventh century of the Christian era in the least. He added a few more names to the lists given by his predecessors and further observed that "the series of flavours such as *madhura* ("sweet") etc. or the names of dissimilar things with unlike initial letters" might also be used for the same purpose. According to NĀRĀYAṆA, only the initial letters of absolute numbers and unknowns should be written in order to indicate them; those of negative numbers must be marked with superposed dots. So said also BHĀSKARA II. But the practice is much older.

Operations with Zero.—The sign of a number, plus or minus, is reversed, writes NĀRĀYAṆA, when subtracted from zero. In illustration, he gives

$$0 - (\pm 5) = \mp 5.$$

BHĀSKARA II, NĀRĀYAṆA's model, states that when a number is multiplied by zero, the product is zero; but in case any further operation has to be performed, the product should be regarded as *Kha-guṇa* ("that which has zero as multiplier"); for if after multiplication by zero, it again becomes a divisor, the number will remain unchanged. That is to say

$$a \times 0 = 0;$$

but $$(a \times 0) \div 0 = (kha\text{-}guṇa) \div 0 = a.$$

A similar statement is made by NĀRĀYAṆA with the remark: When a number is once multiplied and then divided by the same

(different) number, it remains unchanged; for then the operations of multiplication and division will have no effect on the original number and hence become useless. He has also given

$0 \pm 0 = 0$; $0 \times 0 = 0$; $0 \div 0 = 0$; $0^2 = 0$; $\sqrt{0} = 0$.

Still he appears to have been fully aware of the indeterminate character of $\frac{0}{0}$. For he has observed : " A number on multiplication by zero, reduces to zero. It certainly revives again on division afterwards by zero, but being absorbed does not attain its former state; as a great sage does not come forth to (his former mortal) being after being absorbed, through continued self-meditation, into Infinite, Pure, Supreme and Blissful Brahman."

As regards division by zero, NĀRĀYAṆA, like BHĀSKARA II, ŚRĪPATI and BRAHMAGUPTA, teaches that a number divided by zero is *Kha-hara;* the value of a *Kha-hara* is infinite. But unlike them he distinguishes between a positive infinite and a negative one. The illustrative example adduced by him in this connexion runs thus :

" Tell me, o mathematician, if you know it, the quotient of the division of zero by positive and negative three, as well as that of the division of positive and negative three by zero."

The details of his solution are as follows :

" Statement : Dividend 0. Divisor 3, -3. On division the resulting quotient in both the cases is 0.

" Statement : Dividend 3, -3. Divisor 0. On division results the *kha-hara* $\frac{3}{0}$ and $\frac{-3}{0}$. "

We have already stated NĀRĀYAṆA's quotation from BHĀSKARA II as regards the properties of the *Kha-hara*. Symbolically the result will be

$$\frac{\alpha}{0} \pm \beta = \frac{\alpha}{0},$$

α, β being finite quantities.

Surds.—NĀRĀYAṆA defines a surd as a number whose square-root cannot be extracted exactly (11). So did ŚRĪPATI (1039).

(11) COLEBROOKE's statement of the rule of NĀRĀYAṆA is erroneous. (H. T. COLEBROOKE, *Algebra with arithmetic and mensuration from the Sanscrit of Brahmegupta and Bhascara*, London, 1817, p. 145, footnote 1).

This definition has been cited by SŪRYADĀSA (1540). Of course the number is considered as a surd when the operation concerns its roots, not the number itself. NĀRĀYAṆA teaches five methods of addition and subtraction of surds. They are

(i) $\sqrt{a} \pm \sqrt{b} = \sqrt{b}(\sqrt{a/b} \pm 1) = \sqrt{b(\sqrt{a/b} \pm 1)^2}$

(ii) $\sqrt{a} \pm \sqrt{b} = \frac{1}{\sqrt{a}}(a \pm \sqrt{ab}) = \sqrt{\frac{1}{a}(a \pm \sqrt{ab})^2}$

(iii) $\sqrt{a/b} \pm 1 = \sqrt{(\sqrt{a/b} \pm 1)^2}, a > b$

$\therefore \sqrt{a} \pm \sqrt{b} = \sqrt{b(\sqrt{a/b} \pm 1)^2}$

(iv) $\sqrt{a} \pm \sqrt{b} = \sqrt{a + b \pm 2\sqrt{ab}}$

(v) $\sqrt{a} \pm \sqrt{b} = \sqrt{c(\sqrt{a/c} \pm \sqrt{b/c})^2}$.

The methods (i) and (iii) are practically the same. They are to be adopted when a/b is a perfect square. But when ab is a perfect square, the method (ii) or (iv) should be followed. In the method (v), the optional number c is chosen in such a way as will make both a/c and b/c perfect squares. Methods (i), (ii) and (iv) have been taught also by BHĀSKARA II and Method (v) by BRAHMAGUPTA. ŚRĪPATI multiplies by a suitable optional number c instead of dividing. In multiplication and other operations, the work can be abridged, observes NĀRĀYAṆA, like BHĀSKARA II, by simplifying the surd expressions previously by the addition or subtraction of as many terms of them as possible.

Ex. Multiply $\sqrt{32} + \sqrt{18} + \sqrt{8} + \sqrt{2}$ by $2 + \sqrt{2}$

Ordinary method :

$$(\sqrt{32} + \sqrt{18} + \sqrt{8} + \sqrt{2})(2 + \sqrt{2})$$

$= \sqrt{128} + \sqrt{72} + \sqrt{64} + \sqrt{36} + \sqrt{32} + \sqrt{16} + \sqrt{8} + \sqrt{4}$

$= (\sqrt{64} + \sqrt{36} + \sqrt{16} + \sqrt{4}) + \sqrt{2}(\sqrt{64} + \sqrt{36} + \sqrt{16} + \sqrt{4})$

$= (8 + 6 + 4 + 2) + \sqrt{2}(8 + 6 + 4 + 2)$

$= 20 + \sqrt{800}.$

Abridged method :

$\sqrt{32} + \sqrt{18} + \sqrt{8} + \sqrt{2} = \sqrt{2}(\sqrt{16} + \sqrt{9} + \sqrt{4} + 1)$

$= \sqrt{200}$

$$\therefore (\sqrt{32} + \sqrt{18} + \sqrt{8} + \sqrt{2})(2 + \sqrt{2}) = \sqrt{200}(2 + \sqrt{2})$$
$$= 20 + \sqrt{800}.$$

He teaches two methods of division of surds. One is akin to the ordinary process of division of one algebraic expression by another and the other consists of multiplying the dividend and divisor by an expression obtained by changing the sign of an optional term of the divisor and so on repeatedly until there is left only one term in the divisor. For instance, we have by the ordinary method

$$\sqrt{5} + \sqrt{36}) \; 5 + \sqrt{90} + \sqrt{180} + \sqrt{648} \; (\sqrt{5} + \sqrt{18}$$
$$5 \qquad + \sqrt{180}$$
$$\sqrt{90} + \sqrt{648}$$
$$\sqrt{90} + \sqrt{648}$$
$$\times$$

According to the second method

$$\frac{\sqrt{175} + \sqrt{150} + \sqrt{105} + \sqrt{90} + \sqrt{70} + \sqrt{60}}{\sqrt{5} + \sqrt{3} + \sqrt{2}}$$
$$= \frac{(\sqrt{175}+\sqrt{150}+\sqrt{105}+\sqrt{90}+\sqrt{70}+\sqrt{60})(\sqrt{5}+\sqrt{3}-\sqrt{2})}{(\sqrt{5} + \sqrt{3} + \sqrt{2})(\sqrt{5} + \sqrt{3} - \sqrt{2})}$$
$$= \frac{\sqrt{2100} + \sqrt{1800} + \sqrt{1260} + \sqrt{1080}}{\sqrt{60} + \sqrt{36}}$$
$$= \frac{(\sqrt{2100} + \sqrt{1800} + \sqrt{1260} + \sqrt{1080})(\sqrt{60} - \sqrt{36}}{(\sqrt{60} + \sqrt{36})(\sqrt{60} - \sqrt{36})}$$
$$= \frac{\sqrt{20160} + \sqrt{17280}}{\sqrt{576}}$$
$$= \sqrt{35} + \sqrt{30}.$$

Approximate values of Surds.—The rule given by BHĀSKARA II for finding the approximate value of a fractional surd may be expressed as

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{abn^2}}{bn} = \frac{R}{bn},$$

where n is an arbitrary large number and R is the nearest square-

root of abn^2. ĀRYABHAṬA II takes $n^2 = 10000$. ŚRĪPATI's formula is

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{abn^2 \times 10000}}{bn \times 100} = \frac{R'}{bn \times 100},$$

where as before n is a large whole number optionally chosen and R' is the nearest square-root of $abn^2 \times 10000$ in integers. On putting $b = 1$ in the above we shall get formulae for approximation to an integral surd. Such a formula has been expressly stated by ŚRĪDHARA. The oldest formula used by the Hindus was

$$\sqrt{N} = \sqrt{a^2+r} = a + \frac{r}{2a} = \frac{\left(\frac{r}{2a}\right)^2}{2\left(a + \frac{r}{2a}\right)}.$$

To find the approximate value of $\sqrt{N}$, NĀRĀYAṆA (12) solves the quadratic indeterminate equation

$$Nx^2 + 1 = y^2$$

in positive integers. If $x = \alpha$, $y = \beta$ be a solution of this equation, then, says he,

$$\sqrt{N} = \frac{\beta}{\alpha} \text{ approximately.}$$

In illustration of his method, NĀRĀYAṆA finds approximations to $\sqrt{10}$ and $\sqrt{1/5}$. Since the roots of

$$10x^2 + 1 = y^2,$$

are (6, 19), (228, 721), (8658, 27379),... we have

$$\sqrt{10} = \frac{19}{6}, \frac{721}{228}, \frac{27379}{8658}, \cdots$$

Again the values of (x, y) satisfying the equation

$$\frac{1}{5}x^2 + 1 = y^2,$$

are (20,9), (360, 161), (6460, 2889),... Therefore

$$\sqrt{1/5} = \frac{9}{20}, \frac{161}{360}, \frac{2889}{6469}, \cdots$$

Indeterminate Equations of the first degree.—For the general

(12) See BIBHUTIBHUSAN DATTA, " NĀRĀYAṆA's Method for finding Approximate value of a Surd," *Bull. Cal. Math. Soc.*, XXIII (1931), pp. 187-194.

solution in positive integers of the simple indeterminate equation

$$by - ax = \pm c \qquad (1)$$

where a, b, c are whole numbers, generally called the KUṬṬAKA (or " pulveriser ") in Hindu algebra, NĀRĀYAṆA teaches nothing more than what was achieved before by BHĀSKARA II, BRAHMAGUPTA (628), and ĀRYABHAṬA I (499).

(i) Suppose a and c have a common measure g, such that $a = a'g$, $c = c'g$. Then, we have

$$by - a'gx = \pm c'g,$$

or

$$by' - a'x = \pm c', \qquad (1.1)$$

where $y' = y/g$. If $x = \alpha$, $y' = \beta$ be a solution of (1.1), then clearly $x = \alpha$, $y = g\beta$ is a solution of (1).

(ii) Let b and c have a common measure g', so that $b = g'b'$, $c = g'c''$. Then the equation (1) will transform to

$$b'y - ax' = \pm c'', \qquad (1.2)$$

where $x' = x/g'$. If $x' = \alpha'$, $y = \beta'$ be a solution of (1.2), then the solution of (1) will be $x = g'\alpha'$, $y = \beta'$.

(iii) Next suppose $a = a'g$, $c = c'g$; also $b = b''g''$, $c = c'''g''$. The equation (1) will now be reduced to

$$b''y' - a'x' = \pm c''' \qquad (1.3)$$

where $x' = x/g''$, $y' = y/g$. Then if $x' = \alpha''$, $y' = \beta''$ be a solution of (1.3), we shall have $x = g''\alpha''$, $y = g\beta''$ as the solution of (1).

The above devices oftentimes shorten the operations in the method of solving the equation $by - ax = \pm c$. Again, suppose $x = \alpha, y = \beta$ be the least integral solution of $by - ax = c$. Then

$$b\beta - a\alpha = c.$$

Hence $b(a - \beta) - a(b - \alpha) = -c$.

Therefore $x = b - \alpha$, $y = a - \beta$ is a solution of the equation $by - ax = -c$. Since $\alpha < b$, $\beta < a$, this solution is positive. So NĀRĀYAṆA takes $by - ax = c$ as the standard form of the simple indeterminate equation.

Square-nature.—BRAHMAGUPTA established the lemma that if $x = \alpha, y = \beta$ be a solution of the square-nature *(varga-prakṛti)*

$$Nx^2 + k = y^2,$$

and $x = \alpha', y = \beta'$ be a solution of

$$Nx^2 + k' = y^2,$$

then $x = \alpha\beta' \pm \alpha'\beta, y = \beta\beta' \pm N\alpha\alpha'$ is a solution of the equation

$$Nx^2 + kk' = y^2.$$

If $a = a'$, $\beta = \beta'$ and $k = k'$, we get $x = 2a\beta$, $y = \beta^2 + Na^2$ as the solution of

$$Nx^2 + k^2 = y^2.$$

With the help of these lemmas, BRAHMAGUPTA could find any number of integral solutions of the equation,

$$Nx^2 + 1 = y^2,$$

where N is a non-square integer, after having found one solution of it. NĀRĀYAṆA, like his predecessors, expressly states that " by composition of equal as well as unequal sets of roots (will be obtained) an infinite number of roots," of this equation. In illustration, he solves an example from BHĀSKARA II,

$$8x^2 + 1 = y^2,$$

substantially as follows : We have obviously

$$8.1^2 + 1 = 3^2. \qquad (1)$$

Composing with itself, we get

$$8.6^2 + 1 = 17^2. \qquad (2)$$

From the composition of the forms (1) and (2), we have

$$8.35^2 + 1 = 99^2. \qquad (3)$$

Again from (1) and (3) we get

$$8.204^2 + 1 = 577^2. \qquad (4)$$

In this way, observes NĀRĀYAṆA, an infinite number of roots can be obtained.

Having found one solution of the equation

$$Nx^2 \pm c = y^2,$$

NĀRĀYAṆA could find an infinite number of solutions by combining it with the solutions of $Nx^2 + 1 = y^2$. He solves the equation

$$13x^2 + 17 = y^2,$$

substantially thus : We have obviously

$$13.1^2 + 3 = 4^2,$$

$$13.1^2 + 51 = 8^2.$$

By the composition of these two forms, we get

$$13.12^2 + 153 = 45^2,$$

and

$$13.4^2 + 153 = 19^2.$$

Dividing by 9, we have respectively

$$13.4^2 + 17 = 15^2,$$

and

$$13.(\tfrac{4}{3})^2 + 17 = (\tfrac{19}{3})^2.$$

Cyclic Method.—For the complete solution in integers of the equation $Nx^2 + 1 = y^2$, N being non-square, it has been just observed, we must know at least one integral solution of it.

To obtain the first solution, BHĀSKARA II describes a method of successive reduction. This method is designated as CAKRAVĀLA or the " Cyclic Method." Though BHĀSKARA has attributed its discovery to earlier writers, we do not find it in any available treatise on algebra anterior to his. He may have taken it, like a few other things in his algebra, from the works of ŚRĪDHARA (*c.* 750) or PADMANĀBHA which are now lost. The method is this : If we have a form

$$Na^2 + k = b^2,$$

where N is non-square and a, b, k are relatively prime integers, k being positive or negative, then choosing for the indeterminate multiplier m a positive integer such that

$$\frac{am + b}{k} = \text{a whole number} = a_1, \text{ say}$$

and ' $m^2 - N$ ' is as small as possible, we shall get, says BHĀSKARA, the form

$$Na_1^2 + k_1 = b_1^2$$

where

$$k_1 = \frac{m^2 - \mathrm{N}}{k},$$

$$b_1 = \frac{bm + Na}{k}.$$

BHĀSKARA, in fact, states the values of a_1 and k_1 only and leaves us to find b_1 by substituting them in the original equation. But NĀRĀYAṆA expressly gives the value of b_1 as

$$b_1 = a_1 m - k_1 a.$$

By repeated application of this process, k will be ultimately reduced to $\pm$ 1, $\pm$ 2, or $\pm$ 4. How to proceed next, when k reduces to $-$ 1, $\pm$ 2 or $\pm$ 4 was taught as early as 628 A.D. by BRAHMAGUPTA. In illustration of this method NĀRĀYAṆA solves the equation

$$103x^2 + 1 = y^2.$$

Here we have obviously

$$103.1^2 - 3 = 10^2.$$

By the method of the pulveriser, we get the solution of

$$\frac{m + 10}{-3} = \text{an integer},$$

as $m = -3t + 2$. Putting $t = -3$, we have $m = 11$; so that

$$\frac{m+10}{-3} = -7, \quad \frac{m^2-103}{-3} = -6,$$

and $$\left(\frac{m+10}{-3}\right)m - \left(\frac{m^2-103}{-3}\right).1 = -71;$$

hence we have

$$103.7^2 - 6 = 71^2.$$

The solution of

$$\frac{7n+71}{-b} = \text{a whole number},$$

is $n = -6t + 1$. Take $t = -1$; then $m = 7$. With this value we shall get the reduced form

$$103.20^2 + 9 = 203^2.$$

Proceeding in the same way, we next obtain the form

$$103.47^2 + 2 = 477^2.$$

Now by the principle of composition of equals, we get

$$103\,(2.47.477)^2 + 4 = (477^2 + 103.47^2)^2,$$

or $$103\,(44838)^2 + 4 = (455056)^2.$$

Dividing out by 4, we have

$$103\,(22419)^2 + 1 = (227528)^2.$$

Thus the solution of $103x^2 + 1 = y^2$ is $x = 22419$, $y = 227528$.

NĀRĀYAṆA also finds the lowest integral solution of

$$97x^2 + 1 = y^2,$$

as $$x = 6377352, y = 62809633.$$

Calcutta, May 1, 1932. BIBHUTIBHUSAN DATTA.

The earliest modern maps of Germany and Central Europe

I

Aside from the remarkable but very unscientific EBSTORF map of the thirteenth century (1), only three independent maps or map types of Central Europe have hitherto been recognized as antedating 1500 (2).

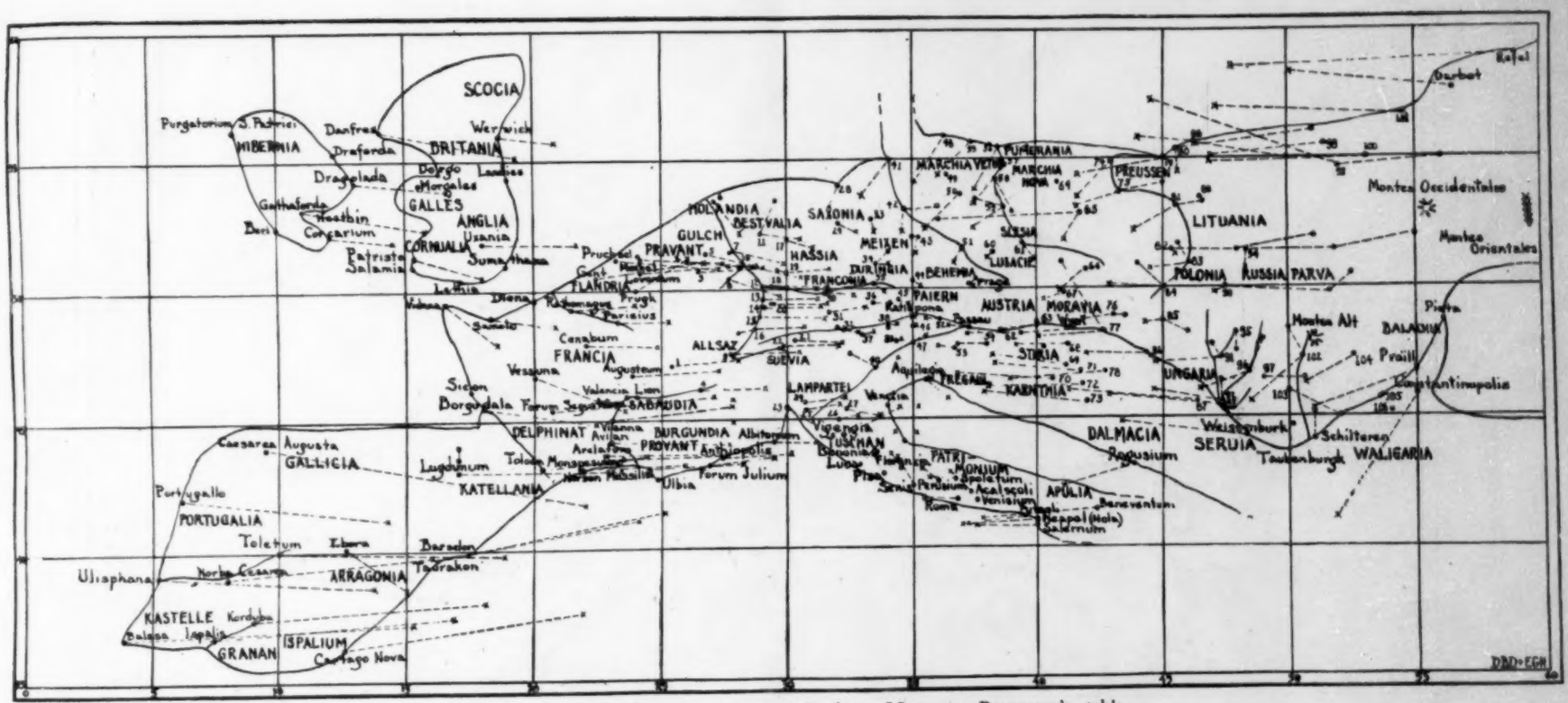
Of these the earliest in origin is the so-called NICHOLAS OF CUSA type, ascribed to the famous German cardinal of the 15th century (3). Whether the scientifically-minded prelate was actually the author of the original map, whether he supplied the data used by some anonymous compiler, or whether he was merely a patron to whom the map was dedicated, are all doubtful questions, for no copy originating in his own lifetime has come down to us. Of the existing versions one (4) was engraved on

(1) See KONRAD MILLER, *Die Ebstorfkarte, eine Weltkarte aus dem 13. Jahrhundert*. Stuttgart and Vienna 1900. (3d edition.)

(2) W. WOLKENHAUER, *Deutschland im Kartenbilde*. Deutsche Geographische Blätter, Vol. XXXIX, Heft 1. Bremen 1919. Compare also the earlier article by Professor WOLKENHAUER's son who died during the war : A. WOLKENHAUER, *Der Nürnberger Kartograph Erhart Etzlaub*. Bremen 1907. Reprinted from Deutsche Geographische Blätter, Vol. XXX, 55-77.

(3) SIEGMUND GÜNTHER, *Nikolaus von Cues und seine Beziehungen zur mathematischen und physikalischen Geographie*. Abhandlungen zur Geschichte der Mathematik, Vol. IX, 123-152. 1899. ERICH KÖNIG, *Konrad Peutinger und die sogenannte Karte des Nikolaus von Cues*. Festschrift Georg von Hertling. Munich 1913. FRANZ VON WIESER, *Die Karte des Nicolaus von Cues*. Verhandlungen der Gesellschaft deutscher Naturforscher und Aerzte, 77 Versammlung, Vol. II, 172. Leipzig 1906.

(4) For some of the problems connected with this map, e.g. whether the date should be emended to 1451, see L. BAGRÓW, *A. Ortelii Catalogus Cartographorum*, Part II. Petermanns Mitteilungen, Ergänzungsheft 210, pp. 29-33. Gotha 1930. For reproductions see S. RUGE, *Ein Jubiläum der deutschen Kartographie*. Globus, Vol. IX, 4 ff. 1891. E. NORDENSKIÖLD, *Periplus*. Stockholm 1897. (Plate XXXV).


SCOCIA
HIBERNIA
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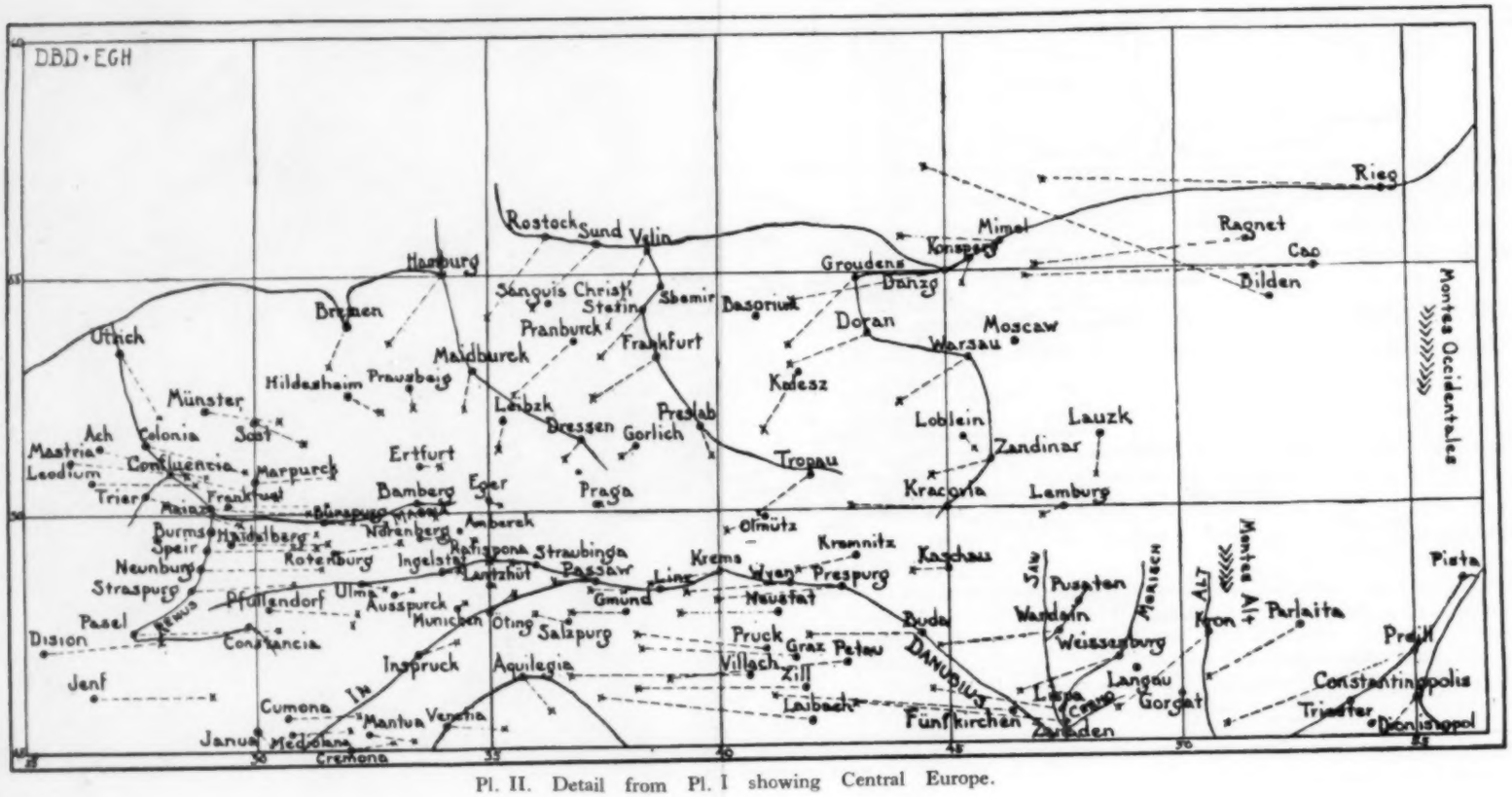
GALLES
ANGLIA
CORNUALIA
FLANDRIA
HOLSANDIA
WESTVALIA
SAXONIA
GULCH
PRAVANT
HASSIA
MEIZEN
DURINGIA
BEHEMIA
FRANCONIA
BAIERN
AUSTRIA
MORAVIA
SUEVIA
ALLSAZ
FRANCIA
SABAUDIA
LAMPARTEI
TUSKHAN
PATRIMONIUM
APULIA
SYRIA
KARENTHIA
UNGARIA
DALMACIA
SERVIA
WALIGARIA
BALDAKIN
LITUANIA
POLONIA
RUSSIA PARVA
PREUSSEN
MARCHIA VETUS
MARCHIA NOVA
PUMERANIA
SAXSIA
LUSACIE
DELPHINAT
BURGUNDIA
PROVANT
GALLICIA
KATELLANIA
PORTUGALIA
ARRAGONIA
KASTELLE
GRANAN
ISPALIUM
Montes Occidentales
Montes Orientales
Montes Alt
Constantinopolis
Darbat
Rafal
Praill
Pietra
Schiltaren
Weissenburch
Tauberburgh
Ragusium
Neapol (Nola)
Salernum
Beneventum
Roma
Pisa
Venetia
Augusta
Lugdunum
Narbon
Massilia
Forum Julium
Ulisphana
Tolletum
Ebora
Barselon
Tarakon
Cartago Nova
Cenaburn
Augustum
Valencia
Viana
Arelatum
Albingaum
Ulbia
Aquileia
Ratispona
Prag
Wien
Passau
Regina
Verona
Mantua
Perusium
Aquilegia
Venetia
Pisa
Lucca
Florencia
Senis
Roma
Capua
Neapol (Nola)
Salernum
Beneventum
Acalcoli
Venisium
Spoletum
Monasterium
Tolosa
Monspessulum
Narbon
Massilia
Arelatum
Avinon
Vienna
Lugdunum
Forum Julium
Albingaum
Ulbia
Barselon
Tarakon
Ebora
Tolletum
Ulisphana
Portugallo
Cartago Nova
Cordube
Malaca
Iapha
Sigen
Borgogala
Vessuna
Lutetia
Diana
Vienna
Rodomagus
Prugh
Parisius
Gant
Brugel
Prucbel
Colonia
Trier
Mentz
Worms
Spira
Basel
Constantz
Augusta
Ulma
Nurnberg
Eistet
Bamberg
Wurtzburg
Erffurt
Hall
Leipzig
Dresden
Prag
Wien
Passau
Ratispona



Pl. II. Detail from Pl. I showing Central Europe.

Pl. III. Map of Europe from Clm. 14583 (fol. 514*v*-515*r*), ca. 1450.

copper at Eichstätt in 1491, and shows the same general characteristics as the maps in the Rome editions of PTOLEMY's *Geographia* (1478 and 1490). Executed in the wrongly-named " Donis " or trapezoidal projection, it apparently originated in the workshop of DONNUS NICOLAUS GERMANUS (5), a somewhat shadowy personality whose handiwork or influence is to be detected in most of the manuscripts and printed editions of PTOLEMY which appeared during the second half of the 15th century.

Another version of the CUSA map was prepared by one HENRICUS MARTELLUS GERMANUS between 1480 and 1490, and now survives in a superb PTOLEMY, and a number of manuscripts of the *Insularium* of the Florentine BUONDELMONTI (6). Professor JOSEPH FISCHER, S. J. who has recently published an excellent facsimile of the MARTELLUS-CUSA map, has promised to demonstrate that the original of this map was drafted in Florence in 1439, (7) but so far his evidence has not been forthcoming. In any case the cardinal's material was widely known and used by cartographers until well into the 16th century.

The second important type was the work of a Nürnberg cartographer and compass maker, ERHARD ETZLAUB (8). Printed from

J. METELKA, *O mapě Kardinála Mikuláše Cusy*. Prague 1895. O. HENNE AM RHYN, *Deutsche Kulturgeschichte*. Vol. I, 420. Berlin 1905. (3d edition.) I. A. J. DE VILLIERS, *Famous maps in the British Museum*. Geographical Journal, Vol. XLIV, 168-88. London 1914.

(5) Professor JOSEPH FISCHER, S.J. has recently published a monumental edition of PTOLEMY's *Geographia* with critical notes on all the known manuscripts and their compilers. Aside from this the most recent discussion of NICOLAUS GERMANUS is that of L. BAGRÓW, *Op. cit.*, 33-37. See also J. FISCHER, S.J., *Die Entdeckungen der Normannen in Amerika*, passim. Freiburg i. Br. 1902. (English translation by B. H. Soulsby, London 1903.) For a brief discussion of the " Donis " projection see F. VON WIESER, *A. E. v. Nordenskiölds Facsimile Atlas*. Peterm. Mitt. 1890, p. 273.

(6) The PTOLEMY MS. is in the Biblioteca Nazionale, Florence (Cod. Magliab. Lat. Cl. XIII, No. 16.) The BUONDELMONTI MSS. are in Leiden, Chantilly and the British Museum.

(7) J. FISCHER, S.J., *Die Karte des Nicolaus von Cusa (vor 1490), die älteste Karte von Mitteleuropa*. Kartographische Denkmäler der Sudetenländer, herausgegeben von Bernhard Brandt, No. 1. Prague 1930.

(8) See A. WOLKENHAUER, *Op. cit.*, passim. Reproductions of the ETZLAUB map are to be found in L. GALLOIS, *Les géographes allemands de la Renaissance*. Bibliothèque de la Faculté des Lettres de Lyon, Vol. XIII. Paris 1890. (Plate I.) Also in *Six early printed maps... exhibited on the occasion of the International Geographical Congress*. Printed by order of the Trustees of the British Museum. London 1928.

wood blocks in differing editions,—the earliest 1492,—these maps are definitely cruder in technique and less elegant as works of art than those of the CUSA type. Nevertheless despite the coarseness of the woodcut lettering, more than 800 names of towns have been crowded into the relatively small sheet. Covering Central Europe in the broadest sense, i.e. the Germanic nations with parts of all the bordering regions, the maps were designed as a practical road guide. The towns are arranged along the principal highways which are shown by a series of dots, the interval between each representing one Germanic mile. All these routes, commercial and pilgrimage, converge on Rome, whence the title of the 1501 edition, " Das ist der Rom-Weg... durch deutszche lantt." Despite the crabbed appearance of the ETZLAUB maps, the geographical elements are disposed more accurately than in those of the CUSA type; the relative position of towns is better preserved, and certain egregious errors such as a North-South orientation of the Rhine, are corrected.

A map of a third independent type was discovered about 1910 in the Coblenz Staatsarchiv (9). It consists of a single badly preserved sheet of parchment bearing on either side a rather crude geographical map. The parchment in its present form is clearly only a fragment of a once larger sheet; in fact one may surmise that the two maps now show only a quarter of their original content. One of the maps is drawn on the trapezoidal " Donis " projection as used by NICOLAUS GERMANUS; the other on the more scientific true spherical projection, a remarkable fact when one considers that it is found in only one other work of this period, the Bologna edition of PTOLEMY of 1472. Altho these maps have fewer names than the two types described above, they are surprisingly accurate. The position of most of the towns is as good as on the ETZLAUB maps, and better than on the CUSA type. From this fact, and from the use of projections relatively uncommon for the period, WOLKENHAUER concludes that the Coblenz fragment must have originated in a highly developed scientific milieu; and the prevalence of Bavarian spelling forms

(9) A. WOLKENHAUER, *Die Koblenzer Fragmente zweier handschriftlichen Karten von Deutschland aus dem 15. Jahrhundert.* Nachrichten von der königlichen Gesellschaft der Wissenschaften zu Göttingen, phil.-hist. Kl., 1910, Heft I, 17-47. (With two plates.)

leads him to ascribe it to a pupil of REGIOMONTANUS working at Nürnberg prior to 1479 (10).

In this, the generally accepted picture of 15th century German cartography, only two main currents have been recognized. One, exemplified in CUSANUS, NICOLAUS GERMANUS, HENRICUS MARTELLUS (and to some extent REGIOMONTANUS), is humanistic with close Italian contacts; the other, more scientific and empirical, is represented by the Nürnberg school.

II

The examination of a manuscript of astronomical and cosmographical content (11) in the Staatsbibliothek at Munich has led me to attempt a modest revision of this picture. As far as I have been able to determine, the manuscript has not yet been studied for its significance in the history of geography.

A brief description will help to show the importance of this codex. The volume is a stout quarto of 522 pages, formerly belonging to the library of the Benedictine monastery of St. Emmeran in Regensburg. It was copied there between 1449 and 1451 by one FRIDERICUS, a monk of St. Emmeran's who also copied a number of other scientific manuscripts now in the same library (12). Of the copyist we know almost nothing altho it is assumed that he may have been a pupil of the celebrated JOHANN OF GMUNDEN, and was probably associated with astronomical observations carried out by him and others at Vienna (13).

The first item in the codex is a series of astronomical tables (ZINNER, Nos. 2812-15), an almanac and two star indexes calculated for 1440 and 1444 at Reichenbach. The connection with the

(10) *Ibid.*, 43-46.

(11) Clm. 14583. Sections of the manuscript are several times listed in E. ZINNER's valuable *Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes*. Munich 1925. (Cf. Nos. 2812-2815, etc.) See also the brief description in the *Catalogus codicum latinorum Bibliotecae Regiae Monacensis*, Vol. IV ii, 198. Munich 1874.

(12) Among others Clm. 14783, which is a compilation from various works including parts of Clm. 14504, a collegiate note book from Vienna dated 1439.

(13) Cf. ZINNER, *Op. cit.*, Note to No. 3578. (*Vide infra*, Note 28.)

Benedictine abbey of Reichenbach (14) is of some interest, for at the time it was considered one of the leading scientific centers of Germany. Its Abbot, ENGELHARD, invented an instrument with gears for showing the true motion of the planets, and compiled astronomical tables which were widely used. His monks were said to have been all proficient in astronomy, and were equipped with the best instruments (15). A further interest attaches to the fact that NICOLAUS GERMANUS, himself, may have received his early scientific training here before he went to Italy. True, recent writers have doubted whether GERMANUS ever was a monk at Reichenbach, but their doubts seem to rest mainly on a conviction that TRITHEIM, who is the only authority for the statement, is not a reliable witness (16). To the present writer, however, it seems that critics should produce more tangible proof of their own before dismissing as incredible the statements of one so nearly contemporary. In any case it appears certain that NICOLAUS GERMANUS was engaged in copying *astronomical* tables (17) at least as early as 1466, i.e. approximately the time when his first PTOLEMY manuscripts began to appear. What could be more plausible than to suppose that he had received his astronomical and geographical training at what was then one of the most developed scientific centers north of the Alps?

Returning to the manuscript, we find that the second item (ff. 81*r*-215*v*) is a transcription of PTOLEMY's *Geographia* followed by the latitudes and longitudes in tabular form. It contains none of the Ptolemaic maps, although these were certainly well known in Germany by the middle of the 15th century.

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(14) There were at least three monasteries called Reichenbach. The one here referred to was in Bavaria not far from Regensburg. It is shown on the MARTELLUS-CUSA map.

(15) ZINNER, *Op. cit.*, Notes to Nos. 3097, 8919, 8947, 10810-11, etc.

(16) In one place TRITHEIM says that GERMANUS was from Reichenbach " ut ferunt," and in another he asserts that he belonged to the Benedictine order, but that the name of his monastery is unknown (memoriae non occurrit.) Cf. the works of BAGRÓW and FISCHER cited above (Note 5). Also J. FISCHER, S.J., *War Pseudo-Donis Benediktiner in Reichenbach?* Historisch-politische Blätter, Vol. CXXVI, 641 etc. 1900.

(17) MS. Vind. lat. 2522 and MS. Vat. Lat. 3107, both with Latin dedicatory verses ascribing the tables to NICOLAUS GERMANUS. It is possible that an examination of these tables (which I have not yet been able to make) and a comparison with the tables of known Reichenbach origin will throw light on the question.

Immediately following the Ptolemaic tables is another in the same style headed " Illas longitudines et latitudines civitatum et insularum inveni extra viii librum et illas conscriptas per Magistrum Reinhardum " (ZINNER, Nos. 8946 and 10571). At the end of that table begins another series of latitudes and longitudes in a quite different style (ff. 222*r*-319*r*) entitled *Cosmagraphia Septem Climatum*. These two compilations are the most important part of the volume, and to them we shall return after a brief description of the remaining items.

Treatises by JOHANN OF GMUNDEN on the Albion and the Quadrant, and MESSEHALLAH on the Astrolabe occupy the next hundred pages, and are followed by extracts on the Holy Land from JACQUES DE VITRY and BROCARD's *Itinerary*, etc.

At the end (491*r* et seq.) there are brief descriptions of Asia, Africa, Europe, " Habitabilis zona," followed by a number of geographical sketches in ink to which further reference will be made below.

III

Concerning MAGISTER REINHARD whose table has been mentioned as one of the important items in the volume, very little information is available. In one manuscript (18) he is described as a cleric at Tegernheim in Bavaria, and is named as the author of a brief description of the astronomical instrument invented by Abbot ENGELHARD of Reichenbach mentioned above. Doubtless he studied in the flourishing University and scientific school of Prague, for in several manuscripts he is mentioned as MAGISTER REINHARD PRAGENSIS (19), and probably later became associated with the astronomical undertakings of Reichenbach and the Vienna school as well (20).

(18) Clm. 83. Cf. ZINNER, *Op. cit.*, Note 8947.

(19) Cf. MS. Leipzig University No. 1472, fol. 168*r*, a brief table of latitudes and longitudes, mentioning MAGISTER REINHARD in a marginal note. Only one of the values, however, coincides with the table in Clm. 14583. Other MSS. which may also be by him are : MS. Par. Reg. 7328, MS. Leip. Univ. 1490 (Zinner 8945), Clm. 4382 (Zinner 7556), and Clm. 7722.

(20) Clm. 10662 written 1430-6 at Vienna and containing works by GMUNDEN and others has a note (4*r*) saying that the book came from a certain JOHANNES FLECKEL " et fuit quondam magistri Reinhardi."

The table, itself, consists of some 210 names of European towns with their geographical co-ordinates listed in degrees and minutes (21). Some of the towns are given more than once, sometimes with identical, sometimes with slightly varying values.

A thorough study of MAGISTER REINHARD's table leads necessarily to a survey of the relatively numerous lists of latitude and longitude which survive in medieval manuscripts, a task which the present writer hopes to accomplish in connection with the work of editing the material described in this article (22). Suffice here to say that the geographical position of many towns had been calculated with varying degrees of accuracy during the 14th and 15th centuries. For Germany the two earliest were probably Braunschweig and Magdeburg whose positions were determined ca. 1325-30 by JOHANNES DE SAXONIA who had studied in Paris. Before the end of the century such towns as Prague, Vienna, Erfurt and possibly Nürnberg had also been placed with considerable accuracy. But it should be noted that for the most part these calculations were made not for geographical but for astronomical, or rather astrological purposes. They were reckoned primarily in order that existing astronomical tables, such as the Toledo, the Alphonsine, the Montpellier tables, could be recalculated for use in the region of a particular observer. In all these tables there was much confusion and inaccuracy, with the result that the lists of latitude and longitude which have come down to us are often completely garbled. Inconsistencies in the choice of an initial meridian from which to reckon the longitudes, confusion of celestial with terrestrial co-ordinate systems, of sexigesimal and decimal angle measures, these and many other

(21) Another copy of the same table also transcribed by FRIDERICUS is contained together with two other tables of latitude and longitude of different origin in Clm. 14783, ff. 509*r*-519*r*.

(22) As a Doctor's thesis for Harvard University. The lack of a comparative study of medieval latitudes and longitudes was noted as far back as 1891 by HERMANN WAGNER, and as late as 1923 he refers to the task as still undone. The present writer hopes in part to fill the gap by editing a number of tables of Italian, Spanish, Portuguese, and North European origin, and wherever possible plotting maps to illustrate the positions. As good examples of treatment of the same materials for earlier periods see J. K. WRIGHT, *Notes on the knowledge of latitudes and longitudes in the Middle Ages.* Isis, Vol. V, 75-98. Cambridge, Mass. 1922. CARL SCHOY, *Die geschichtliche Entwicklung der Polhöhenbestimmung bei der älteren Völkern.* Dissertation. Munich 1911.

sources of error make it difficult to deduce any sound conclusions for the history of geography.

MAGISTER REINHARD's table is of particular interest as being apparently the earliest to combine a large number of scattered observations into a single list with a unified reference system, conceived geographically, and not as a mere auxiliary to astrology. The general accuracy of REINHARD's figures is surprising, especially for the latitudes. Far better than the widely disseminated *Tabula Regionum* of REGIOMONTANUS,—which was intended primarily as an adjunct to the use of astronomical tables, and has no significance for the history of geography (23),—his values can stand comparison with those of APIANUS, STÖFFLER and SCHÖNER nearly a century later. For ten towns in Bohemia, Bavaria and Austria where his observations would naturally be closest, REINHARD's average error is only 4.7 minutes for the latitudes, and APIANUS' error is 7.2 minutes. On the other hand for ten towns of northern Germany REINHARD is at fault by 58.1 minutes against 21.2 for APIANUS. Clearly some fundamental error,—probably a miscalculation of the length of a degree,—must have vitiated this part of his table, since in other parts of Germany he errs by only 8.5 minutes, and for ten towns in the rest of Europe by 16.3 minutes, against APIANUS' averages of 7.1 and 20.9 minutes respectively. In a number of cases REINHARD is right within one or two minutes where APIANUS errs by a whole degree. In fact the honors are fairly even.

Longitudes were less accurate than latitudes in all calculations made prior to the invention of accurate clocks some three centuries later. Although the theory was well understood, the technique necessarily suffered from the lack of good time-pieces. But even aside from this, REINHARD's longitudes seem to have suffered from another fundamental mistake, similar to that which he made for the northern cities. He seems to have underestimated the length of a degree of longitude by 1/5 to 1/3 approximately. The mistake, indeed, is quite understandable when we recall that the degree was variously estimated at 12, 15, 16, 18 and even 20 Germanic miles (slightly less than 8 kilometers to the mile)

(23) Cf. H. WAGNER, *Ueber das von S. Günther* 1888 *herausgegebene spätmittelalterliche Verzeichnis geographischer Koordinatenwerte.* Nachr. d. K. Ges. d. Wiss. zu Göttingen, 1891, p. 277.

in the manuscripts of the time. The Coblenz map, for example, has two mile scales drawn along meridian lines, showing values of approximately $12^1/_2$ and $15^1/_2$ miles to the degree. Of course if all REINHARD's positions had been based on direct astronomical observation we should have to look elsewhere for the source of error. But it seems safer to assume that only a limited number, in the case of the longitudes were derived from his own observation, and that the great majority were based on terrestrial measurements. It would thus be possible to explain the fact that his relative longitudes for Prague and Regensburg, possibly based on direct calculations from eclipses, are accurate within 4 % whereas the majority of the rest err by more than 25 %. (In the case of 15 towns selected from all parts of Europe the average longitudinal distances, expressed in degrees referred to the meridian of Regensburg, were 25.3 % larger than the true value.)

On the basis of the tables in the Munich manuscript the writer has undertaken to plot a map, showing the positions as given by Reinhard compared with their true relative positions. In the reconstruction the meridian of Regensburg has been arbitrarily selected as the base, and has been given REINHARD's value of 35° East. All the true positions have been referred to that meridian.

The resulting map (see Plates I and II) includes most of Europe, and shows the influence of at least three or four sources. Ireland and Scotland and England are drawn from portolani, Spain and France, and parts of Italy from PTOLEMY, whereas the Central European regions are based apparently on a number of more recent surveys. The most accurate part is the Bavarian section, and the course of the Rhine is astonishingly good for the period. Especially full is the nomenclature for the territory of the old Hapsburg Empire, a fact which substantiates the Prague-Vienna origin of the table (24). Striking also is a resemblance to the Coblenz fragment mentioned above. Although the Coblenz map is fuller than REINHARD's by approximately two fifths, practically none of REINHARD's towns are lacking on the former. The longitudes differ considerably on the two, probably because the

(24) Vienna, Passau, Prague, Regensburg, Nürnberg is the order of the opening names on the list. Although all of these and many others are given a second time in the table, Prague is the only one listed thrice.

Coblenz fragment was not based on the diminished value of the degree used by REINHARD. On the other hand the latitudes correspond as closely as could be expected from such a sketchy piece of work, except that in some cases the exaggerated latitudes of REINHARD's north German cities have been reduced.

It becomes apparent, then, that WOLKENHAUER's conclusions in regard to the Coblenz map must be modified. Accepting the Bavarian origin as proved by the orthography, it seems likely that the fragment was compiled under the influence of the Regensburg-Reichenbach school. It was probably drawn later than 1450 for it embodies the material in REINHARD's list as copied by FRIDERICUS, plus information from other sources. It was certainly not compiled later than 1479, as WOLKENHAUER demonstrates, nor is there any reason why it should not be dated as much as two decades earlier. In that case it would coincide with the period in which NICOLAUS GERMANUS was presumably acquiring the scientific training which he later used in his PTOLEMY manuscripts. The use of the trapezoidal " Donis " projection might even warrant us in ascribing the Coblenz map to him or one of his pupils. In any case there is apparently no ground other than the traditional and rather unwarranted fame of REGIOMONTANUS as a geographer for ascribing it to the Nürnberg school.

IV

Turning to the second table, the anonymous *Cosmagraphia Septem Climatum* we are faced with a different set of problems. Here, too, is a list of names with co-ordinates, but vastly longer than that of MAGISTER REINHARD, filling (with numerous short gaps) nearly 100 pages of the codex.

The significance of the word *Cosmagraphia* is made plain from a passage in a contemporary manuscript (25), entitled " Instrumentum de distantiis civitatum et regnorum et de cosmo-

(25) Clm. 11067 copied ca. 1450 by THEODORIC RUFFI of Gronenberch. For a description of the cosmographical material in this MS. see S. GÜNTHER, *Analyse einiger kosmographischen Codices in der Münchener Hof- und Staatsbibliothek*, in his *Studien zur Geschichte der mathematischen und physikalischen Geographie*, No. IV. Halle a.S. 1877-9.

graphia." Princes in their palaces, the author declares, should have painted on their walls large maps of the earth's surface, the climates, and all the main routes of the vicinity. Elaborate instructions are then given for the construction of these maps. They are to be laid out on a system of co-ordinates, determined by a graduated brass strip for the equator, and a vertical meridian axis in the middle for plotting the latitudes. The location of a given town can be taken from a table of latitudes and longitudes (one of which is included in the manuscript), and duly plotted along the axes. (26)

The present *Cosmagraphia Septem Climatum* is doubtless to be regarded as a set of instructions in the form of a co-ordinate list for making just such a map or series of maps. It is probable that the list was compiled from a map already existing on the walls of some monastery or castle, and was intended to be used in duplicating it elsewhere. Certain phrases seem to indicate clearly the presence of an already completed model, e.g. " Taprobana machs wye weit du wild mit dez gemal doch nit gar uber daz mer." (fol. 243*r*).

The seven climates are of course the traditional Ptolemaic and Arabian division of the habitable earth (27). In this case they are of little significance, albeit the latitudes of the seven climates appear sporadically listed in the margin of the text.

The system of co-ordinates is the same throughout the entire table. On examination, however, it turns out to be no true geographical system, but a purely arbitrary one. The latitudes are expressed in degrees and minutes, but they bear no relation to the true values of the positions they represent. The longitudes are expressed, curiously enough, in terms borrowed from astrological star indexes. The 360 degrees are divided into 12 *signa*, and these in turn into 30 degrees of 60 minutes. Thus we have Constantinople located as follows : long. 3^{s} 26^{o} 40′, lat. 50^{o} 14′, evidently values of arbitrary significance.

An examination of the list itself which is compiled in a mixture of Bavarian German and Latin, at first yields only an impression

(26) *Ibid.*, 245-8.

(27) E. HONIGMANN, *Die Sieben Klimata und die πόλεις ἐπίσημοι. Eine Untersuchung zur Geschichte der Geographie und Astrologie im Altertum und Mittelalter.* Heidelberg 1929.

of chaos. Many names appear several times, sometimes with varying co-ordinates, sometimes with none, and many co-ordinates are listed without names. A certain grouping of cities, rivers, islands, mountains, etc. under separate headings, and a rough progression along the meridian lines give some help in orientation. The list becomes clearer, however, when we recall that it is essentially a set of instructions for a map-designer for whom each geographical feature,—source and junctions of rivers, bends of coast line, beginning and end of mountain ranges, etc.—must be mathematically located. A few examples will make this clear, (in the original text each entry is provided with co-ordinates, here omitted) : " Wasser durch daz pirg ", " der weg in daz pirg ist 2 grad weyt " (225*v*), " Anfang der pogen oder etlicher ek dez see meotiden den erst pogen oder spiz " (248*r*), etc.

The list becomes clearer, and many of the repetitions are explained when we discover that not one but several maps are described in the text. The first fifty pages contain material for constructing a sort of world map (or possibly two maps). Paradise is placed in the East at zero longitude, latitude 75 to 90 degrees (fol. 249*r*), and elsewhere (274*v*) it is stated " Hercolis sezt 180 grad wonhaft ertrichz von untergang in aufgang."

There are many Oriental names, and most of the European towns are confined to the 4th and 5th of the twelve 30° longitude units *(signa)* into which the map is divided, i.e. they are located approximately from 90° to 150° west of Paradise. The latitudes run as high as 85° for Baltic towns, and throughout bear no relation to true values. The Canary Islands, as an example, are located long. 7^{s} 22° 30′, lat. 87° 40′.

A few specimens will show the type of legends which were meant to be painted on the map. " Daz orientalisch ' mer ' klain von Orient da ist kain insel in. Daz clain mer von India dar yn seind slangen dye helfant und kemel tier indaz mer zyehent" (268*r*). " Andropofagei sind gar pösz leut " (274*v*). " Canaria dy ainer von franskreich neilich gefundat hat, und ist ain reiche insel von weyn "(245*v*).

The second section of the manuscript (278*r*-298*v*) contains the data for making a detailed map of Central Europe, and is perhaps the most interesting feature of the entire volume. Listing over 600 names, most if not all of which can be identified with

present day equivalents, it embodies the material for a map as detailed and in many respects as accurate as any of those hitherto known from this period. Altho in some points, e.g. the south Bavarian and Tirol regions, it shows a certain similarity with the CUSA map, in its main features it is clearly independent of any of the maps we have described, and is probably the earliest of them all. The original certainly cannot be later than 1449, since FRIDERICUS gives us that date for his copying in several places. The reference to the Canary islands as recently discovered by the French (actually in 1402) hardly allows us to go back of the second decade of the 15th century. If, as the present writer believes, the material in the *Cosmagraphia* was originally collected in the school of JOHANN OF GMUNDEN at Vienna, then it is probably to be ascribed to the decade 1425-35, the period of GMUNDEN's chief activity.

The zero meridian apparently cut the map in the middle. The left or western half was divided into *signa* (30° units) 1 to 6, and the right Eastern half contained *signa* 7 to 12 (albeit only a few names are listed in this half). Altho the co-ordinates were used in the same fashion as in the world-map, they here correspond even less to true geographical references.

From the fact that the zero meridian and the 45° parallel intersect in the middle of the map just between Vienna (11^s 28° 40′—45 °40′) and Klosterneuburg (0^s 0° 20′—44° 40′) and from the fact that the map is rich, to the point of being unique in the century, in Austro-Bohemian names, we find further confirmation for its origin in the Vienna school. Besides GMUNDEN himself, it is possible that co-workers or students like GEORGE OF KLOSTERNEUBURG, MAGISTER REINHARD, and even our monk FRIDERICUS may have helped in the compilation (28).

The general arrangement of the list follows the hydrographical outline. Towns are grouped chiefly along rivers, some 35 in number, and for each of these the source, principal bends, and junctions with important tributaries are duly indicated with co-

(28) ZINNER, *Op. cit.*, Notes 3539, 40, 49, 51, 71, 83 etc. GEORGE OF KLOSTERNEUBURG, Prior of the important monastery near Vienna, was a contemporary of GMUNDEN. He reckoned astronomical tables for Prague, Nürnberg, Vienna, Klosterneuburg, etc., an undertaking in which the monk FRIDERICUS was apparently associated.

ordinates. There is also a section for towns not located near river, marsh or lake. None of the picturesque legends or descriptive phrases that were found in the world-map are given in this section.

As for the geographical merits of this map, judgment must be reserved until the task of reconstructing it has been achieved. One may note, however, that serious errors must have crept in during the assembling of the map. The Rhine, for example, not content with the inaccurate North-South orientation of the CUSA and Coblenz maps, actually flows consistently toward the Northeast; and the Danube bends too far south between Regensburg and Vienna. On the other hand the Bohemian material appears to be much the best of the entire period. Doubtless the map was put together from a number of sources of varying merit, and the task of correlating them must have been difficult for these pioneers of modern cartography.

The next section (ff. 300*r*-312*r*) is headed " Schyfkarten : 4ta pars descriptionis terre." The map here was evidently based on a portolan chart, stretching from " ain spiz dez roten mer 0^{8} 0^{0} $0'$ — 34^{0} $50'$ " thru Oriental, Spanish, German, Italian and other European coasts. The latitudes increase rapidly until in Scandinavia they pass 110^{0} (!) showing clearly that the usual system of geographical co-ordinates is not being used here.

The last section (ff. 315*r*-319*r*) is headed "Cosmographia septem climatum secundum antiquos." Altho it contains chiefly Oriental and classical names, it also includes a number of European towns. It breaks off abruptly after returning to Babilonia and Sancta Katharina—" hic magnus defectus in 7 climatibus."

A word remains to be said of the rather crude ink sketches which fill the last pages of the volume. Altho separated by much intervening material from the tables which we have been discussing, these miniature maps clearly bear some relation to them. They consist of the outlines of some thirty separate river courses (taken from all parts of the world) with a few towns located along each. For the most part purely schematic, in the case of the Rhine and the Danube they are fairly elaborate, amounting almost to small hydrographic studies, of a type not uncommon in Italian manuscripts of the same period (29). In

(29) Notably hydrographic studies of the Po region. Cf. R. ALMAGIÀ, *Monumenta Italiae Cartographica*. Florence 1929. Another sketch of the same order

addition there is a general map of Europe, (see Plate III) south oriented, and extremely crude and inaccurate, e.g., Constance is apparently located on the coast of the Bay of Biscay. It contains a considerable number of the towns on MAGISTER REINHARD's list and likewise shows interesting resemblances to the Coblenz fragment. None of these maps have any co-ordinates or mile scales. They appear to be rough notes, perhaps designed to aid in constructing the completed map.

V

In conclusion then, pending the completion of a detailed study of this manuscript and a reconstruction of all the maps described in it, the writer wishes to set forth a few of the tentative results toward which this study has led him, hoping for criticisms and suggestions that will help him to go further.

The examination of this manuscript indicates the existence of a scientific movement hitherto unnoticed in the history of geography. The traditional priority of REGIOMONTANUS and the Nürnberg school is seen to be gratuitous, and increasing importance must be attached to the astronomical centers of Vienna and Prague and the activities of the south German Benedictines. The date of the earliest modern maps of North European nations can now be placed with certainty in the first half of the 15th century, perhaps as early as the third decade. Nor is it enough to invoke the influence of Ptolemy (though that was certainly present to a degree) nor of Italian humanism to account for the rise of this cartography. While it is doubtless true that Italy was the first country to achieve a partial delineation of its own geography, it is also probable that Bavarian-Austrian learning in the person of NICOLAUS GERMANUS contributed much to its scientific completion. The traditional line between southern enlightenment and northern barbarism, between Renaissance science and medieval ignorance is shown in this particular case to have been largely fictitious.

DANA B. DURAND.

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not included in ALMAGIÀ's imposing work is to be found in an anonymous cosmographical work in the Biblioteca Marciana of Venice (Cod. lat. VI, 24). So far as I know it has not been published.

Plate I is an attempt to reconstruct the map of Europe based on MAGISTER REINHARD's tables. Plate II is a detail of the complete map, showing the Central European portion on a larger scale. Most of the towns which are shown on Plate II are simply indicated by reference numbers on Plate I. The index given below will serve as a key to the numbers.

The maps are constructed without any attempt at scientific projection, the length of a degree being taken as equal throughout, whether latitude or longitude. The map extends from 0° to 60° longitude East, omitting for practical convenience, two towns on REINHARD's list which lie farther to the north-east, (*Narb*, long. 62° 0′, lat. 60° 0′ and *Nogardia*, long. 66° 0′, lat. 61° 0′).

Each town is plotted in its position with a heavy dot, ●, according to REINHARD's values, while the relative true position is shown by an *x*. (The longitudes are all referred to the meridian of Regensburg, 35° 0′, East.) A broken line connects the two positions. Where more than one value is given by REINHARD, all are shown on Plate I, but only the most accurate one on Plate II. In a few cases, where it was impossible to identify the modern equivalent of REINHARD's name, the true position, of course, could not be plotted. The placing of „Moscaw" in Poland, may spring from a confusion with the town of Maków. Names of provinces given in capital letters are placed as close as possible to the town names to which they are attached in the manuscript. Names of rivers expressly mentioned, and located in the list are written in, but a number of other rivers are drawn conjecturally by connecting towns which lie along them. The coast outlines, likewise, are purely conjectural.

I am indebted to Miss ELEANOR G. HAYES for the lettering of the maps.

1) Dision
2) Mastria
3) Leodium
4) Jenf
5) Ach
6) Utrich
7) Colonia
8) Trier
9) Pasel
10) Confluencia
11) Münster
12) Mainz
13) Burms
14) Speir
15) Neunburg
16) Straspurg
17) Sost
18) Frankfurt
19) Marpurck
20) Haidelberg
21) Pfullendorf
22) Constancia
23) Janua
24) Cumona
25) Mediolana
26) Cremona
27) Mantua
28) Bremen
29) Hildesheim
30) Burzpurg
31) Rotenburg
32) Ulma
33) Prausbeig
34) Ertfurt
35) Bamberg
36) Norenberg
37) Ausspurck
38) Ingelstat
39) Munichen
40) Inspruck
41) Hamburg
42) Maidburck
43) Leibzk
44) Eger
45) Amberck
46) Lantzhüt
47) Öting
48) Rostock
49) Sanguis Christi
50) Pranburck
51) Dressen
52) Straubinga

53) Salzpurg
54) Gmünd
55) Sund
56) Velin
57) Sbemir
58) Stetin
59) Frankfurt
60) Gorlich
61) Preslab
62) Linz
63) Krems
64) Basorium
65) Kalesz
66) Tropau
67) Olmütz
68) Neustat
69) Pruck
70) Villach
71) Graz
72) Zill
73) Laibach
74) Groudens
75) Doran
76) Kremnitz
77) Prespurg
78) Petau
79) Danzg
80) Konsperg
81) Warsau
82) Loblein
83) Zandinar
84) Kracovia
85) Kaschau
86) Buda
87) Fünfkirchen
88) Mimel
89) Moscaw
90) Lemburg
91) Wardain
92) Lispa
93) Zanaden
94) Lauzk
95) Pusaten
96) Weissenburg
97) Langau
98) Ragnet
99) Bilden
100) Cao
101) Rieg
102) Kron
103) Gorgat
104) Parlaita
105) Triester
106) Dionisiopol.

Notes and Correspondence

Query no 21.—JOHN COAKLEY LETTSOM. "I am preparing a life of the famous eighteenth-century Quaker physician and philanthropist, JOHN COAKLEY LETTSOM (1744-1815), and have had access for this purpose to all the letters and documents preserved by his descendants. But a great mass of manuscript material was entrusted to his first biographer, T. J. PETTIGREW, and this seems to have been disposed of by his heirs in 1906. I should therefore be most grateful if any one possessing any such documents, not printed by PETTIGREW in his official Life published in 1817 would allow me to have them copied. J. JOHNSTON ABRAHAM, 22, Queen Anne St., Cavendish Sq., W. 1." (Reprinted from the *Times Literary Supplement*, London, Sept. 29, 1932.)

Query no. 22.—"Wind-blowers." Can you refer me to any literature concerning the origin and history of the symbolical figures, in the form of human heads, with blasts of air issuing from their mouths, that were commonly placed in the margins of the maps of several centuries ago, to show the direction of the winds and the corresponding compass points. They are also found in a good many old pictures, including, for example, some of those of ALBRECHT DÜRER. They are, I believe, sometimes called "wind-blowers."

(*Washington D. C.*) C. F. TALMAN.

Institut d'Histoire des Sciences de l'Université de Paris. — *Séminaire d'histoire et philosophie des sciences.* — Année 1932-1933.

Conférences faites pendant le semestre d'hiver : GUERON : « LOEB »; PAPANASTASSIOU : Les Théories de la lumière de NEWTON à MAXWELL; RUSSO : Recherches préliminaires à des travaux sur l'histoire des Techniques; EL KHODEIRY : « L'Atomisme musulman »; JEAN MARIANI : Causalité et déterminisme; PERREAU : Relations entre Physique et Géométrie dans le Principe de la Relativité; EL ANNABI: Le Principe d'indétermination et la part de l'instrument mathématique dans la physique contemporaine. — Programme du second semestre : MERY : La Causalité chez KANT et chez SCHOPENHAUER; LUPESCO : Réflexions sur la Philosophie des Sciences et la signification de la Microphysique; PINEL : 1° Les mathématiques appliquées à la Vaccinothérapie; 2° L'élément mathématique en Mécanique des fluides.

Notice. The devaluation of the dollar is increasing the Editor's losses to such an extent that it has become necessary to adopt new policies. To begin with, authors will not receive any more reprints free of charge; but if they so desire, they may obtain some from the printers at their own expense. The size of *Isis* will be reduced but unfortunately this restriction cannot be applied at once because many long papers have been accepted which must be published : the Editor will keep every engagement even as he was faithful to his pre-war promises as soon as the publication of *Isis* was resumed after the war. On that account this year's losses will probably be exceptionally heavy.

Cambridge, Mass. June 12, 1933. G. S.

Reviews

Fritz Saxl; Arthur Beer.—*The zodiac of Quṣayr 'Amra*, by FRITZ SAXL. *The astronomical significance of the zodiac of the Quṣayr 'Amra*, by ARTHUR BEER. Reprinted from K. A. C. CRESWELL, Early Muslim architecture, vol. 1, p. 289-303, 19 figs., 1 pl. Oxford, Clarendon Press, 1932.

The fresco in the dome (diameter, 9 ft.; built, ca. A.D. 715) of the *calidarium* of Quṣayr 'Amra is the earliest known representation of the constellations on the inside of a spherical surface. The painter —who was an artist, not an astronomer—attempted to represent more than half of the sky on the inside of a nearly hemispherical cupola; the desire to record some of the southern as well as all of the northern constellations was legitimate, because he was especially interested in the zodiacal belt; the means of projecting the sky on the available surface were, however, inadequate. He placed the pole in the zenith, at the top of the cupola, and lifted the horizontal equator, thus avoiding the interruptions due to the windows at the base of the dome. The equator corresponds, roughly, to the first century of the Hegira, i.e., to the VIIth or VIIIth century of our era; the dating of the zodiac by the position of the vernal equinox is impossible for reasons given below. A series of horizontal circles corresponds, according to the computations of A. BEER, to the declinations $+67^{\circ}$ (pole of the ecliptic), $+50^{\circ}$, $+40^{\circ}$, $+30^{\circ}$, $+23^{\circ}$ (summer solstice), $+20^{\circ}$, 0°, -23° (winter solstice), and -40°; an auxiliary horizontal circle, a few degrees above the northern tropic, is still visible on the fresco. There are no vertical hour-circles. The ecliptic coordinates are represented by twelve longitude arcs meeting at the pole of the ecliptic, in Draco, and by a zodiacal belt (which, however, lies to the north—not on both sides—of the ecliptic). The presence of four windows at the base of the dome interfered with the representation of the southern constellations; the painter could not resist the temptation of displaying Sagittarius in the space available between two windows—and sacrificed the astronomical correspondence of the zodiacal constellations with the thirty-degrees intervals of longitude marked by the twelve arcs. The dating of the fresco—or of the original globe—by the position of the equinoxes is, therefore, impossible.

The southern constellations, in the wide zone at the base of the dome, were well taken care of, in spite of the somewhat arbitrary shifts due to the presence of the windows. The northern constellations, squeezed into the calotte above the raised equator, suffered from lack of space, so that Cepheus and Cassiopeia, e.g., had to be fused into one constellation combining the astronomical and mythological features of both. The orientation of the individual mythological figures does not always correspond to the arrangement of the stars belonging to these figures. More important than the accidental inconsistencies in the orientation of some of the constellations is the systematic reversal of the order of all of the constellations. In the case of a celestial globe, i.e., of the projection of the sky on the convex surface of a sphere, we have the choice between two evils : a " mirror-image " globe capable of following the rotation of the sky, or else a " retrograde " globe decorated with the " direct-vision " images of the constellations. This dilemma does not confront an intelligent painter decorating the concave surface of a spherical dome—provided, of course, that he is familiar not only with the mythological pictures on globes and star charts, but also with the changing aspects of the starry heavens. The painter of the Quṣayr 'Amra copied, apparently, a globe, not a chart ; it is the reviewers opinion that, he used a " mirror-image " globe provided with an up-to-date system of declination circles; as a result of the painter's lack of astronomical knowledge, the earliest known representation of the constellations on the inside of a spherical surface reverses the order of the constellations in the sky.

ARTHUR BEER's elaborate investigation (p. 296-303, with 6 figures) of the fresco from the astronomical point of view is based on a photograph of the interior of the dome made by K. A. C. CRESWELL (with a ZEISS Double Protar, *f* 18.5 cm.) ; since the objective was below the center of the cupola, the photograph suffers from a distortion of the mythological figures and of the coordinates ; these perspective distortions were eliminated by the use of an aerotopograph (R. HUGERSHOFF's system). A. BEER's three star charts *de luxe* (diameter, 9 in.) are a worthy contribution to CRESWELL's lavishly illustrated UMAYYADS volume. The plate added to the reprint offers three photographic prints : (1) the dome of the *calidarium* in its actual state ; (2) a detail of the zodiac (Sagittarius region) ; and (3) a reconstruction of the fresco, drawn by MAGDALENA STEIN ; the second photograph differs from the reproduction of the Sagittarius region on pl. 51 of the bound volume of CRESWELL's work.

FRITZ SAXL made a detailed study (p. 289-295, with 13 figures) of the sources used by the painter. " By means of an astronomical error

and various peculiarities of our picture we are enabled... to refer to a specific group of Greek manuscripts which the artist of Quṣayr 'Amra must have known. One of the most striking astrothetical errors of the fresco is that Hercules appears, not between Bootes and Ophiuchos, but after them. In Codex Vat. graec. 1087 (fifteenth century) is a Greek map of the heavens which has exactly the same error. The sources for some of its examples, however, are preserved in a PTOLEMY manuscript of the beginning of the ninth century, which is also to be found in the Vatican Library (Codex. Vat. graec. 1291), and the comparison of original and copy shows that the copyist did his work with care. We may then assume that our error already existed in the Greek maps of the heavens in the early Middle Ages (probably already in late antiquity)." Further links between the Vatican codices and the Quṣayr 'Amra fresco appear in the representation of Coma, Aquarius, and of several other constellations. "It is no longer possible to doubt that the stellar pictures preserved in the two manuscripts of the Vatican must have been related to the source used by the painter of the dome. So much for the basic Greek character of the work. But to what extent is it medieval? Generally speaking, there are three figures which differ from those known to us in the Greek map of the stars, but which thoroughly coincide with those of the later Oriental globes. They are the figures of Cepheus, Bootes, and Orion." A comparison of the Maragha-Dresden globe of 1279 with the Quṣayr 'Amra fresco points to a common source. "Quṣayr 'Amra is clearly a connecting link between the Classical style and that of the late Middle Ages in the East." "The cupola of Quṣayr 'Amra is *Greek in the late Classical sense of the term.* And it is only because the later medieval art and science of the East is based on this very phase that we find *also* later in the East those changes from the Classical period which are already to be seen in Quṣayr 'Amra. Thus we can clearly recognize in what manner the representation of the constellations in the dome of Quṣayr 'Amra is to be considered as a connecting link between the late Classical period and Islam." A. P.

Ṣāliḥ Zekī (Late professor of mathematics in the Faculty of Science of the University of Istanbul).—*Athār-i-Bāqiya*, a history of Arabic mathematics. Two volumes. 512 p. Istanbul, Maṭba'a-i-'Āmira, National Press, 1329 (1911) (in Turkish).

The author, one of the best modern mathematicians of Turkey, intended his work to be in four volumes. Unfortunately he died in 1921 after publishing the first two volumes. In those he dealt with Arabic trigonometry and arithmetic. The author himself uses the terms of Moslem or Oriental mathematics and mathematicians instead of Arabic

mathematics and mathematicians. He gives no reason in his preface for the substitution of Moslem and Oriental for Arabic. But from the biographical sections of the volumes one sees that he pays great attention to the racial origin of the oriental scholars. As a matter of fact quite a number of scholars whose names suggest Arabic origins happen to be of Persian or Turkish origin. Notwithstanding his effort to discriminate in this line, ṢĀLIḤ ZEKĪ keeps a laudable impartiality throughout his entire work, a most essential requisite for a historian, especially for a historian of science. He says in his preface :

" I do not aim at writing a complete history of Oriental mathematics, although such a work would be very useful in explaining the progress of the human mind in the Orient. But such a work would be incomplete because of the non-existence of a comprehensive history of Oriental civilization of the time my work aims to cover. A complete history of Oriental mathematics demands a knowledge of all the influences of cultural progress on the human consciousness of the time; otherwise such a history can never be free of speculation and personal judgment. Nevertheless, I am attempting to give an account of the principal works of Oriental mathematicians and of what they added to the ancient Greek mathematics up to the time when mathematics was transmitted through them to the Occident. I do not mean to exalt the Oriental scholars whereby to flatter the nationalistic sentiments of Oriental peoples. No, my chief aim is to expose original works buried in Oriental public libraries for centuries. I have divided my work into four volumes giving it the title of *Athār-i-Bāqiya*, dedicating the work to the memory of the illustrious mathematician and philosopher ABŪ AL-RAIḤĀN AL-BĪRŪNĪ."

Volume I.

In the introduction of the first chapter the author gives a short account of Greek knowledge on triangles. He treats the famous theorem of MENELAUS (both plane and spherical) and the obliquity of the ecliptic. In the conclusion of his introduction, he asserts that the Greeks have used in astronomical problems, as trigonometrical figures, only the complete quadrilateral. And the only method employed by them was the method of chords. The first chapter deals with the establishment of trigonometry by the Oriental mathematicians as a science to be taught after the geometry of EUCLID and before the astronomy of PTOLEMY. He bases his assertion on the work of THĀBIT IBN QURRA, on the transversals (1). A complete copy of this book is not available, only one chapter dealing with the theorem of MENELAUS being included in the treatise on transversals by NĀṢIR AL-DĪN AL-ṬŪSĪ. He ascertains that THĀBIT IBN QURRA determined the angles by their sines instead of the chords of their doubles, and that he demonstrated for the first time

(1) *Kitāb fī shakl al-qaṭṭā'*.

the theorem of MENELAUS with the help of sines. To prove his contention the author inserts the entire chapter, translated from the Arabic examplary (copied directly from the handwriting of THĀBIT IBN QURRA, and annexed as an appendix to the *Kitāb fī shakl al-qaṭṭā'* of NĀṢIR AL-DĪN AL-ṬŪSĪ) (2). From the translation of THĀBIT IBN QURRA's chapter ṢĀLIḤ ZEKĪ deduces the following two points :

First, the use of sines is not a Greek invention borrowed by the Arabs ; on the contrary, it is a real first step towards the science of trigonometry by the Oriental mathematicians.

Second, THĀBIT IBN QURRA, born in 826 A.D. was the first Moslem mathematician to use sines and not AL-BATTĀNĪ as is generally supposed, the latter being born about 32 years later.

As a conclusive argument ṢALIḤ ZEKĪ brings forward a table of sines extracted from the tables called *Tabulae probatae* (3), by ḤABASH AL-ḤĀSIB, who flourished under AL-MA'MŪN, a quarter of a century earlier than AL-BATTĀNĪ.

In the following section of the first chapter the author deals with the sine theorem relating to the spherical triangles, designated by the Arabs as Shakl al-mughnī 'an shakl al-qaṭṭā' (theorem independent of the theorem of transversals).

Beginning with a quotation from ABŪ RAIḤĀN AL-BĪRŪNĪ, " The precedence in the invention of this theorem (umbra versa) belongs without any controversy to ABŪ-L-WAFĀ'," ṢĀLIḤ ZEKĪ explains very thoroughly the contemporary notions of the Arabs about tangents, co-tangents, secants, and co-secants.

Taking the treatise on transversals by NĀṢIR AL-DĪN AL-ṬŪSĪ once more into consideration the author explains trigonometrical ratios both plane and spherical. Finally, he gives the four essential ratios of spherical trigonometry demonstrated by the Arabs as being the same ratios in use to-day. Discussing various trigonometrical tables he reproduces literally the table of sines and tangents by ḤABASH AL-ḤĀSIB. He corroborates anew the fact that the Oriental astronomers were aware of the tangents before the time of AL-BATTĀNĪ (ninth century). But he reiterates explicitly that the merit of introduction of tangents as a trigonometrical line in the formulae belongs to ABŪ-L WAFĀ'. However he admits also that in the tables compiled before ABŪ-L-WAFĀ', the tangents were already existent but that the forerunners of ABŪ-L-WAFĀ' lacked the courage to use tangents as independent functions on account of their infinite increase.

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(2) The work is in the library of EDHEM Pasha, Istanbul.

(3) *Zīj al-mumteḥin*.

In the following three sections there is a detailed account of the tables of ABŪ-L-WAFĀ', of ULŪGH BEG and of QĀḌĪ-ZĀDE RŪMĪ and especially of the calculation of the sines of the 1° arc. The introduction of decimals instead of sexagesimals in the trigonometrical tables of the Orient belongs to TAQĪ AL-DĪN MOḤAMMED IBN MA'RŪF, who compiled a table in the sixteenth century in Istanbul. He was also the founder of the first observatory in the Ottoman Empire.

The concluding chapter of the first volume opens with the following quotation from HANKEL's *Geschichte der Mathematik* : " The discovery of ABŪ-L-WAFĀ' (discovery of the tangents, Shaql al-ẓill) is quoted only by one author, namely ULŪGH BEG. It has had no influence on the future progress of trigonometry. REGIOMONTANUS was forced to discover the tangents once more in the fifteenth century."

ṢĀLIḤ ZEKĪ, after giving a short account of REGIOMONTANUS's and PURBACH's contributions to trigonometry, discusses at length HANKEL's assertion. In the first place he quotes from MONTUCLA the passages relating to the famous treatise of REGIOMONTANUS (*De triangulis planis et sphaericis cum tabulis sinuum*) and to the various posthumous addenda in SCHOENER's edition.

Secondly, he adduces another quotation from the *Encyclopaedia Britannica* (Trigonometry, E. W. HOBSON) confirming HANKEL's assertion about the rediscovery of tangents in the fifteenth century. He shows that the first translation of the *Almagest* by GERARD OF CREMONA must have been made on the basis of a copy corrected and amplified by THĀBIT IBN QURRA. If one accepts the testimony of NĀṢIR AL-DĪN, who says explicitly that THĀBIT IBN QURRA added the sines and the theorem of sines to the *Almagest*, one can easily believe that both PURBACH and REGIOMONTANUS had a source containing already all the notions on sines.

Thirdly, the same theorem (i.e., that the sines of the angles of a spherical triangle are proportional to the sines of the opposite sides) exists in the book of astronomy (*Kitāb al-hai'a*) of JĀBIR IBN AFLAḤ. This work of JĀBIR's was very useful to the Occidental astronomers for three centuries.

Fourthly, the famous *Scientia stellarum* by AL-BATTĀNĪ, which was translated into Latin, contained clearly the notion of sines as well as that of the functions called *umbra extensa* and *umbra versa*.

Considering the fact that REGIOMONTANUS studied these three Oriental works, ṢĀLIḤ ZEKĪ refutes the idea of HANKEL and HOBSON that REGIOMONTANUS rediscovered the tangents, and he wonders at a paragraph in the article by SUTER, on ABŪ-L-WAFĀ' in the *Encyclopaedia of Islām*, obviously borrowed from an article by CARRA DE VAUX (*Journal Asiatique*) ascribing the introduction of tangents and secants to ḤABASH AL-ḤĀSIB.

It is true that ḤABASH AL-ḤĀSIB had computed a table of tangents; but, as mentioned above, AL-BĪRŪNĪ, after commenting and perfecting those tables in a special opusculum, said that the merit of the introduction of those theorems in trigonometry belongs definitely to ABŪ-L-WAFĀ'. ṢĀLIḤ ZEKĪ explains this error as a confusion between the discovery of the ratios $\frac{sin}{cos}$ and $\frac{cos}{sin}$, and the introduction of the tangent as an independent function in trigonometry.

Volume II.

In the second volume, after a short account of Greek and Indian arithmetic, borrowed partly from ROUSE BALL's *History of mathematics*, the author deals with the arithmetic of the Arabs. In the introduction of the first chapter he mentions the first Greek works translated into Arabic. In fact, by the tenth century Oriental mathematicians had translated the works which the Greeks called Arithmetica, under the name of Aritmāṭīqī. After the tenth century they often wrote on Logistics, which they had adopted immediately after their conquest of Syria and Mesopotamia.

All of the operations of Logistics being executed on a board spread over with a thin layer of sand, they called it the calculus of the board (ḥisāb al-takht). The word takht (board) being a Persian word, the author admits that the Arabs learned the use of the board from the Persians (4). On the other hand the name of ḥisāb al-ghubār (dust calculus) among the Arabs of Spain was very common, and it is only after the fourteenth century that the name began to be used by the Eastern Arabs.

Subsequently the Eastern Arabs obtained the positional arithmetic from Hindu sources and called it ḥisāb al-Hindī (Indian arithmetic), while their Spanish brethren continued to call it the dust calculus. According to the author, the scarcity of paper in Spain was responsible for the keeping up of the name dust calculus.

The Arabs had been from old acquainted with mental calculus which they called ḥisāb al-hawā'ī (5). It must be remembered that the term " hawā'ī " was first used by the Arabs of Spain and passed over to the

(4) See the article, The origin of the ghubār numerals, by SOLOMON GANDZ, *Isis*, 16, 396, 1931.

(5) In a Ms. translated from the Arabic, Ghubar calculus and Hawai calculus (Traité d'arithmétique, traduit de l'Arabe, extrait des *Atti dell' Accademia Pontiflcia de' nuovi Lincei*, 1866), WOEPCKE wrote only in a footnote : Ghubar=pulvis; Hawa=aer. Je crois que l'expression « Calcul hawai, » que je rencontre ici pour la première fois ne désigne pas autre chose que ce qu'on appelle en France « Calcul de tête ».

Orient from there. The first book written in the Orient on mental calculus, was the *Kitāb al-ḥisāb bilā takht bal bil-yad*, by ABŪ-L-QĀSIM AL-MUJTABĀ AL-ANṬĀQĪ. The author cites the book *Al-kāfī fī-l-ḥisāb*, by AL-KARKHĪ, as the text used in the Orient for mental calculus. For Hindu arithmetic, the *Mughnī* by AḤMAD AL-NASAWĪ was the usual text. Among the Occidental Arabic works, the little work of IBN AL-BANNĀ' was the recognized text for Hindu calculus, and for mental calculus, *Al-kāfī fī-l-ḥisāb al-hawā'ī* by ABŪ-L-QĀSIM IBN AL-SAMḤ AL-GHARNĀṬĪ.

The Hindu arithmetic was greatly developed by Arabs. They included in it all the rules for the determination of unknown quantities, for instance, the rule of double false position, and the proportions, and even the ḥisāb al-jabr wal-muqābala. They also included in it geometrical problems by giving numerical values to the lines, planes, and solids. Consequently, Oriental mathematicians considered measuring and surveying as branches of arithmetic. The division of estates among the heirs according to cannon law was also a branch of it ('ilm al-farā'iḍ).

The first chapter begins with the following quotation from the *Grande Encyclopédie* :

" Mais avant de s'attacher à la science grecque, les Arabes avaient été séduits par celle de l'Inde. Leurs conquêtes de ce côté les avaient conduits dans un pays dont la culture, après des emprunts incontestables aux Alexandrins, s'était développée avec indépendance. Les Arabes connurent donc le Sindhind avant l'Almageste, ils appellèrent la géometrie handasa (art Indien), ils empruntèrent aux Hindous leur numération écrite, qu'il n'y avait plus à perfectionner, et en trigonométrie l'usage des sinus (au lieu de la corde) et peut-être de la tangente " (PAUL TANNERY).

ṢĀLIḤ ZEKĪ, in a footnote, immediately refutes the etymology of the Arabic term handas (geometry) as explained by WOEPCKE by the term Indian art (*Journal Asiatique*, 1863). But he reserves his argument for the fourth volume on the History of geometry which was not published. It must be remembered in any case that the arguments brought forward by WOEPCKE seem highly acceptable. However, ṢĀLIḤ ZEKĪ reiterates that the two passages concerning the etymology of the term handasa quoted from IBN SĪNĀ by WOEPCKE were taken from an erroneous copy of IBN SĪNĀ's *Shifā'*.

It is well known that the Arabs, after conquering Syria, adopted ās numerals the Greek letters, and even kept their official books of the treasury in the Greek language, the finance officers being Syrians. The caliph, WALĪD I, issued a decree prohibiting the use of the Greek language but authorizing the use of Greek numeral letters. Subsequently the Arabs giving to their own letters a numerical value, composed a system

of numeration called arqām-i-jumāl, which is used to-day only in chronograms.

Like many other historians of mathematics, ṢĀLIḤ ZEKĪ admits that the Arabs adopted Hindu numerals in the latter part of the eighth century; he also affirms the identity of the Indian and ghubār numerals with some slight difference of form. The Arabs in their later works used both words, ghubār and Indian, for numerals without any distinction. The author quotes as an example of this confusion a Turkish work of the sixteenth century in Istanbul written by IBN ḤAMZA AL-MAGRIBĪ, called *Tuḥfat al-aʿdād*.

The sign of zero in the Arabic arithmetic was originally a circle; it was only after the twelfth century that the Orientals substituted the dot for the circle as the sign of zero. Until the eighteenth century in Turkey, zero was always indicated by a circle. ṢĀLIḤ ZEKĪ complains of the many errors which the adoption of the dot as the sign of zero gave rise to.

The following section is devoted to the refutation of WOEPCKE's famous articles in the *Journal Asiatique*, May, June, July, 1863. The author, after taking all the important passages out of the particular article dealing with the origin of the Indian numerals, and BOETHIUS's *Ars geometriae*, gives a long account of PAUL TANNERY's refutation in the *Grande Encyclopédie*. From a few lines of ṢĀLIḤ ZEKĪ's refutation one gathers that he worked on the question since 1889, when he published his *Mémoire sur les chiffres Indiens*. At the end of the chapter, he sums up his arguments against WOEPCKE's article as follows:

I. The passages of the *Ars geometriae* relating to the famous "apices" are not sufficient proof that the Indian numerals were known to the Greeks of Alexandria before the Arabs introduced them into the Oriental mathematics, because the copies of the *Ars geometriae* containing those passages were written at the earliest in the eleventh century, that is after the conquest of Spain by the Arabs.

II. To prove that the Indian numerals were transmitted to the Romans through Alexandrian neo-Pythagoreans, one should produce a Greek or Latin work written in the earlier centuries of the Christian era, using the Indian numerals. But the Indian numerals are non-existent in the works of these early centuries, preceding the Arab conquest of Spain.

The author speaking of the decimal fractions, records that these fractions were used for the first time by GHIYĀTH AL-DĪN JAMṢHĪD of Samarkand. This Turkish mathematician wrote between 1425 and 1432 an opusculum called the *Risālat al-muḥīṭīya*, dealing with the calculation of the ratio between circumference and diameter, i.e., the approximative value of π. He had expressed this value by means of letter numerals and

sexagesimal fractions, but later he expressed it again by means of Indian numerals with decimal fractions. JAMSHĪD, instead of using the comma to separate the integer number from the rest, used the word ṣaḥāḥ which he placed on top of the integer part. The rest of the chapter is given to an account of all the rules for the solution of problems, namely, the proportions and the rules of three, and the rule of the double false position, etc., all of which were very successfully used by the Arabs.

The concluding chapter deals with ḥisāb al-hawā'ī, mental calculus, based on the treatise *Al-kāfī* by AL-KARKHĪ. ṢĀLIḤ ZEKĪ explains in a long footnote that PAUL TANNERY, after studying the German translation of that treatise by AD. HOCHHEIM, assumed that AL-KARKHĪ had returned to the Greek method of numeration, because he had not used a single Indian numeral in it, quoting every number in full letters. According to ṢĀLIḤ ZEKĪ his use of letter numerals was due to the fact that he wrote the treatise as a memorandum book for shopkeepers and merchants, for the purpose of familiarizing them with mental calculus. As a matter of fact the Greeks did have a kind of mental calculus, but they have always recorded results by the aid of their letter numerals. On the other hand the mental calculus called ḥisāb al-hawā'ī by the Arabs was not followed by the recording of results either with letters or with numerals and no abacus was used. AL-KARKHĪ himself states in his preface that he intended this treatise for the common people (nās). ṢĀLIḤ ZEKĪ adds that this treatise on mental calculus was intended for a public the majority of which consisted of those who could read but could not write. Considering that in AL-KARKHĪ's time the Indian numerals had been established for two centuries, it would be difficult to believe that he had abandoned them for the Greek method of numeration. Further, in his algebra, he used the Indian numerals, remaining indifferent to Greek authors, excepting DIOPHANTOS.

ṢĀLIḤ ZEKĪ notes that AL-KARKHĪ, in his treatise on mental calculus, written for the common people, begins with multiplication omitting addition and subtraction. This omission is due, according to ṢĀLIḤ ZEKĪ, to the great familiarity of the Arabs with these two fundamental processes. He adds that for the people who cannot add and subtract mentally a further mental calculus is not possible.

Further referring to the fourth chapter of AL-KARKHĪ's book he gives the following example :

" If you wish to multiply two thousand five hundred by seven hundred and fifty, divide the first number by one thousand. You will have two and a half; divide the second number by one hundred and you will have seven and a half. Then multiply the seven and a half by two and a half, and you will have eighteen

and a half and a quarter. And then to find the result you must add to the hundred thousand times of eighteen, a hundred thousand times a half, and a hundred thousand times a quarter, which is a very easy operation."

The author infers from this example once more that the *Kāfī* was not a regular treatise on arithmetic but a book of mental calculus, for AL-KARKHĪ starts with his method of multiplication based on the use of fractions, although he had not dealt with fractions in the preceding chapters. In an ordinary arithmetic text book such a method would be out of place.

ṢĀLIḤ ZEKĪ discusses a noteworthy point about the fractions in Arabic arithmetics. The Arabs called rational fractions (expressible fractions) the first nine fractions whose numerator is the unit. All the other fractions were gathered under the names of composite and surd fractions.

The true reason for putting the fractions from 1/2 to 1/10 in a particular class is due to the existence of special terms to express each of these fractions in the Arabic language. Further, the Arabs had a legendary facility in their use of these fractions. Consequently the Oriental mathematicians tried to reduce all the other fractions to rational fractions by factorization, in order to be able to enunciate them. If a fraction was reducible to one or two or three of the rational fractions, they called them composite fractions ; if not, surd fractions (kusūr ṣammā') (7). ṢĀLIḤ ZEKĪ notes that the distinction of the first nine fractions, and the reduction of all the others to the former, was a real impediment to arithmetical progress in the Orient. He complains that the early Turkish authors followed the Arabs in this matter.

The biographical parts of the first and second volumes are very detailed and accurate. The names of the authors are correctly indicated and the principal works are critically dealt with. The last author mentioned is a Turkish mathematician of Istanbul, who lived in the eighteenth century. He was called ISMĀ'IL IBN MOḤAMMED GHELENBAVĪ.

I believe that ṢĀLIḤ ZEKĪ's book will be of great value to students of the history of mathematics. It should interest also the Orientalists. Not only has the author gone directly to the original works and manuscripts, but, being an Oriental himself and familiar with Oriental languages both in letter and spirit, he was able to avoid erroneous interpretations. His Occidental training and vast knowledge coupled with his unusual intellectual ability enabled him to handle the intricate Oriental

(6) See *Traité d'arithmétique*, traduit de l'Arabe, par F. WOEPCKE, *loc. cit.*, p. 14. And the article, A mathematical text by MORDECAI COMTINO, by PINCUS SCHUB, *Isis*, 17, 64, 1932.

and Mediaeval material with an admirable scientific outlook and an impartial and clear judgment.

Since my writing of this review, it has come to my knowledge that the third and fourth volumes of this history were already completed by the time of the author's death and that the manuscript of them is kept in the University Library of Istanbul (8).

Dr. A. ADNAN.

Paul Tannery (1843-1904).—*Mémoires scientifiques* publiés par J. L. HEIBERG et H. G. ZEUTHEN. Vol. XI. Comptes rendus et analyses, 1877-1904. xx+644 p. Toulouse, PRIVAT, 1931.

The first volume of these invaluable *Mémoires* (1912) was reviewed in the first volume of *Isis*; the tenth (1930) in our sixteenth volume (p. 155-57), and references to these volumes or to other TANNERY publications will be found passim in the whole of our series.

It has been my habit to analyze each volume, mentioning the title of every item and adding remarks, but the present volume includes too many different items to be dealt with in the same way. It will suffice to say that the reader will find in it no less than ninety-six reviews published during the years 1877 to 1895. These reviews cover the most important publications of that period relative to the history and the philosophy of science and the history of philosophy. Many of these reviews are very important, others less so, and one at least (no. 92) is insignificant. Volume XII now being printed will contain the reviews written by the great scholar during the last ten years of his life, together with an index to both volumes which are truly inseparable.

While the series of *Mémoires* is in progress (there will be fifteen volumes in all) TANNERY's other works are not neglected. *Pour l'histoire de la science hellène*; *de* THALÈS à EMPÉDOCLE (1887) was reprinted in 1930 (*Isis*, 15, 179-80); the *Astronomie ancienne* and the *Géométrie grecque* will soon be reprinted. What matters even more, two of TANNERY's great projects are on the stocks: In the first place, the Rev. LAURENT of Istanbul and the abbé ROME of Louvain are completing the edition of PACHYMERES. In the second place, Mme. TANNERY herself, helped by C. DE WAARD of Flushing and RENÉ PINTARD of Sens is editing MERSENNE's correspondence. We are looking forward with keen anticipation

(7) *Editorial note.* We are very grateful to Dr. ADNAN for his summary of a Turkish work which otherwise would have remained unknown and secret to the great majority of the historians of mathematics. The author has dealt with a number of moot questions, each of which would call for ample discussion; it is sufficient at present to have some idea of his solution of them. G. S.

to the publication of these two works. God save Mme. TANNERY for the completion of her magnificent undertaking!

GEORGES SARTON.

R. P. Azaïs et R. Chambard.—*Cinq années de recherches archéologiques en Ethiopie*, province du Harar et Ethiopie méridionale. Préface par EDMOND POTTIER. 2 vols. in quarto. Texte avec 6 planches et une carte hors texte. xv+348 p.; Atlas, 110 pl. Paris, GEUTHNER, 1931 (350 frs.).

En Septembre 1923, au moment où l'Ethiopie (1) fut admise dans la Société des Nations, le Révérend Père AZAÏS, capucin français, ancien aumônier militaire, qui avait déjà exploré ce pays, rencontra à Genève le Ras NADO (un des grands chefs abyssins) et celui-ci lui fournit un croquis détaillé d'un gisement de colonnes phalliques qu'il avait découvert à Abera (Sidamo). Ce témoignage précis (voir p. 148) corroboré par des légendes et des traditions coptes et arabes décida le P. AZAÏS a entreprendre une nouvelle exploration en Abyssinie, et surtout dans le sud du pays, la région Sidamo autour des lacs Margharita et Chamo. Il comptait même pousser jusqu'au lac Rodolphe, mais dut y renoncer. Ses projets furent subventionnés par le gouvernement français et l'Institut et on lui donna comme compagnon M. ROGER CHAMBARD. Les résultats de cette expédition ont été tout à fait extraordinaires. J'en eus connaissance pour la première fois grâce au beau livre de M. A. KAMMERER sur l'histoire antique de l'Abyssinie (Paris, 1926) et je m'empressai de les communiquer à nos lecteurs (*Isis*, 9, 449-50, 1927). Je suis heureux de pouvoir leur annoncer maintenant la publication détaillée et admirablement illustrée de ces découvertes sensationnelles.

Parmi les résultats de ces explorations qui furent faites par le Père AZAÏS, soit seul soit avec son jeune compagnon, et qui s'échelonnent de 1921 à 1926, il faut placer hors de pair cinq découvertes, que je ne puis mieux résumer qu'en employant les propres termes de M. EDMOND POTTIER (Préface, p. vii) :

« 1° Dans le pays de Harar, au nord de la capitale Addis-Abeba, une nombreuse série de dolmens funéraires fait entrer l'Abyssinie au nombre des pays où foisonnent ces monuments dont la diffusion sur une aire géographique immense, embrassant certains points de l'Europe, de l'Asie et de l'Afrique, n'a pas encore reçu d'explication définitive.

2° Dans le pays de Gouragué, au sud d'Addis-Abeba, nos compatriotes ont trouvé des tumulus funéraires dont la base entourée de gros blocs en calottes hémisphériques, bombées sur une seule face. rappelle les cercles de pierres usités dans certaines régions de France.

(1) Ceci est le nom officiel du pays; Abyssinie est le nom habituel.

3° Des statues-menhirs, analogues à celles de nos départements de la Marne, du Gard, de l'Aveyron, etc., en forme de dalles plates, arrondies par le haut et surmontées d'une tête humaine grossièrement indiquée, sont couvertes d'ornements sculptés où l'on reconnaît les détails d'un costume richement brodé. Les unes sont féminines; d'autres, beaucoup moins nombreuses, barbues, masculines.

4° Plus bas encore, du côté du lac Margarita, dans le pays de Ouallamo, au Soddo, on a rencontré d'autres dalles funéraires sculptées de deux types différents, l'un portant une figure humaine de forme géométrique, les bras levés, le corps réduit à deux jambes séparées, l'autre où sont alignés en files horizontales des glaives ou poignards de dimensions courtes et trapues, souvent opposés par les pointes.

5° Enfin, surprise plus nouvelle et plus inattendue que les autres, dans le pays de Sidamo, placé à l'est des lacs qui marquent le point le plus méridional de l'expédition, ont apparu de véritables bosquets de hautes colonnes en pierre, d'aspect phallique, souvent réunies par groupes de huit à dix, qui évoquent le souvenir des bétyles de la Palestine, des obélisques d'Egypte, du lingam hindou, images des forces génératrices de la nature. Il est probable que les stèles monumentales conservées à Aksoun et connues de tous les voyageurs sont une survivance de ces symboles primitifs. On évalue à plusieurs milliers le nombre fabuleux de ces colonnes disséminées dans la région voisine des Lacs. Une grande quantité de ces pierres portent des signes étoilés qui font penser au culte du soleil ».

Ces pierres phalliques dont beaucoup sont en basalte sont extrêmement nombreuses (plus de 10.000 ont été identifiées et il doit y en avoir beaucoup plus), et atteignent des hauteurs de 3 et 4 mètres et même davantage ; elles sont si réalistes que leur nature phallique est indubitable. Ces pierres se trouvent d'ailleurs dans d'autres parties de l'Afrique du Nord. Dans mon compte rendu précédent (*Isis*, 9, 450), j'avais déjà signalé celles du pays Mandingo (Gambie anglaise). L'auteur en cite d'autres encore (p. 240) :

« De l'autre côté de l'équateur, au Kenya Colony, au Congo, au Sénégal même, on a trouvé des pierres phalliques. DAWIDSON vient d'en découvrir au Cameroun. Nous lisons dans le *Bulletin de l'Afrique occidentale française*, 1925, sous la signature du Dr. MAES, un important article sur la découverte de colonnes pareilles aux nôtres aux environs du lac Tundidaro, dans l'Isso Ber (Soudan français). Il a vu là un gisement de 150 monolithes en grès rougeâtre finement poli, ' en forme de phallus, avec le gland bien dessiné, les rainures représentant le sillon du gland, et les bourses figurées par des saillies arrondies dont les plis longitudinaux rappellent les plis du scrotum '. »

En général, il semble que les civilisations néolithique et paléolithique se sont développées sur une grande partie du continent africain, et l'on peut même se demander avec PITTARD et avec le P. AZAÏS si l'Afrique ne serait pas le berceau de notre race, plutôt que l'Asie ? Peut-être ne sera-t-il jamais possible de résoudre ces questions, mais les découvertes abyssiniennes dont je viens de rendre compte nous invitent à les poser.

L'ouvrage du Père AZAÏS est plutôt un récit de voyage qu'un traité scientifique, mais il a été fait avec beaucoup de méthode et de soin et constitue une base excellente pour les recherches ultérieures.

Il se termine par des appendices anthropologique et paléontologique et par un mémoire de M. PAUL RAVAISSE sur les stèles et inscriptions arabes du Harar (p. 283-309). Les stèles avec inscriptions trouvées en pays Galla sont au nombre de 18, mais deux seules sont datées (666 = 1267-8, 675 = 1276-7). Elles soulèvent des problèmes assez difficiles. Il n'y a pas de glossaire, mais l'index contient tous les termes locaux.

Plusieurs centaines de photographies sont reproduites sur 110 planches mobiles contenues dans un cartonnier. Cette disposition est fort commode.

Il faut féliciter la maison GEUTHNER non seulement pour ce beau livre mais pour beaucoup d'autres qui constitutent déjà une vraie bibliothèque abyssinienne : citons par exemple le Bulletin géez, *Aethiops*, dirigé par SYLVAIN GRÉBAUT, le dictionnaire de J. BAETEMAN (1929 ; *Isis*, 15, 312), les ouvrages de M. CHAINE, M. COHEN, R. P. COULBEAUX, J. FAITLOVITCH, M. GRIAULE, I. GUIDI, J. HALEVY, A. KAMMERER et O. LÖFGREN.

GEORGE SARTON.

Ralph H. Major.—*Classic descriptions of diseases.* With Biographical Sketches of the Authors. XXVII+630 pages, 127 illustrations. Springfield, Ill. & Baltimore, Md. : CHARLES C. THOMAS, 1932. Price, $ 4.50.

The reading of the original description of a disease is a sound introduction to the study of the disease itself. All of our greatest clinicians, both here and abroad, have emphasized the value of the historical approach to medicine. OSLER set the style for many years, in this country, by having his students look up the first notes on a disease, when seeing a patient, and this same attitude is evident in his classic textbook of medicine ; in every chapter there is a short historical introduction and often a quotation from the original description.

The medical world has long anticipated a book to which it could turn, with the classical descriptions of diseases given a form where easy reference was possible. This Dr. MAJOR has given us ; in his volume we find a large range of quotations, from the best medical literature of earliest times to the present. The book is divided into a number of parts, including chapters on particular diseases, such as tuberculosis, diphtheria, lead poisoning, diabetes, and many others. In addition, clinical conditions or syndromes which can hardly be considered as definite diseases, such as heart block, gallop rhythm, bronchial casts, Skodaic resonance, and similar pathological states are described. The selections appear to be accurately reprinted. In most cases there is a

short biographical note appended to the quoted material. There are numerous illustrations, many of them excellent, including photographs of physicians as well as important bookplates or other data that may be pertinent to the description.

There is, therefore, much to be admired in this book; and yet, it seems far from satisfactory and does not come up to the high standard one had hoped to find in a book of such importance. A few points of criticism are worthy of note. The material is very unevenly chosen; some diseases, such as appendicitis and diabetes, have many references, bringing the subject up to the present time and even going into the more recent subject of treatment, particularly if a specific medication has been found. BANTING's work on insulin and MINOT's on liver feeding in pernicious anemia are both included, although they could hardly be called "classic descriptions of disease," for they deal only with treatment. A certain amount of material, therefore, could well have been omitted and used in a subsequent work dealing with treatment rather than symptomatology. If this matter were carried to a logical conclusion by Dr. MAJOR, one would expect to find notes on EHRLICH and the treatment of syphilis, and the specific treatment of diphtheria, to mention only two instances; neither is to be found in the book.

A more important criticism, however, is that in regard to the biographical sketches appended to the descriptive text. Here one often finds the usual facts easily obtainable in any good book of reference, without any particular data in regard to the man's discovery. What one really wishes to know is how the physician came upon the idea and felt the urge to describe the disease or syndrome in question; how old was he at the time; where was the work done; who were his friends; how was he influenced by other men doing similar work; what was the reception given to his contribution; how soon did it exert an influence on the history of medicine? All of these questions, unfortunately, are ignored by Dr. MAJOR.

In addition, one should note the topography of the book. Much space has been wasted by reproducing the selections exactly in their original form. No attempt has been made to take out from the selections only important and pertinent matter. If this had been done, at least one-sixth or one-eight of the pages given to the book might have been saved; a heavy book of over 600 pages might have been made much lighter and shorter, without losing any of its value.

On the other hand, we owe Dr. MAJOR a great debt for having put so much labor into a valuable contribution to medicine and medical history. Here one can find, in spite of the defects noted above, the original descriptions of most of the important diseases in medicine.

That, after all, was the purpose of the book, and in that he has succeeded admirably. It is hoped that when a second edition is called for, he will check up the numerous typographical errors and mistakes in spelling, rearrange his material, omit from his quotations much that is irrelevant, and present us with a smoother but equally useful book.

(*Boston.*) HENRY R. VIETS.

Thirty-Seventh Critical Bibliography

of the

History and Philosophy of Science and of the History of Civilization

(*to December* 1932)

This thirty-seventh Bibliography contains about 590 items, which have been kindly contributed by the following scholars :

C. W. ADAMS (Hertford, England)
R. C. ARCHIBALD (Providence, R. I.)
T. L. DAVIS (Cambridge, Mass.)
L. GUINET (Brussels)
C. A. KOFOID (Berkeley, Cal.)
J. MILLÀS VALLICROSA (Barcelona)
J. PELSENEER (Brussels)
A. POGO (Cambridge, Mass.)
G. SARTON (Cambridge, Mass.)

It includes as usual a series of addenda and errata to SARTON's *Introduction to the History of Science*, vols. 1 and 2 (Baltimore and London, 1927 and 1931).

Papers and books sent to the Editor are entered in this bibliography if they are relevant to its purpose. They may be the object of analytical notes or longer reviews, if this seems sufficiently necessary and the services of competent scholars are available. It is obvious that only a small number of publications can be adequately reviewed and that it is not even possible to give a brief description of each and every one. However, our classification is so comprehensive and so minute, that even if we do nothing but give the accurate title of an item and put it in the proper place, we are already rendering a real service to the author, the publisher, and the learned public. ***There is no relation between the importance of a publication and the length of the note devoted to it.***

Readers of this Bibliography have complained because some items known to them had not appeared in it or appeared only after too long a delay. The best way to answer that criticism is to explain how this Bibliography is compiled. The Editor's original ambition was to publish only items which he had been able to check upon the original documents

with his own eyes. However, while many irrelevant papers are sent to him (1), some of the most relevant and most important fail to reach him. If in his turn he fails to record these publications promptly enough, who should bear the blame for this failure? Surely not he. Should the blame not fall rather upon the author or the publisher? The Editor cannot be expected to register publications which he has not been able to see. Yet even in such cases he tries to fill the gaps of the Bibliography either by reference to other libraries, or by the insertion of items based on reviews published in other journals.

The current practice of *Isis* is as follows. A number of scientific journals are read by the Editor and his associates and notes relative to the relevant material are typed. The notes relative to original articles are included at once; on the contrary, the second-hand notes (i.e., those based on reviews) can be admitted only after some kind of confirmation (e.g., by means of another review) has been obtained, and thus their insertion may be delayed considerably. There are at present in the editorial drawers some 1500 notes waiting confirmation.

Notes sent in by contributors cannot be checked by the Editor upon the originals; hence these contributors are responsible for them.

In conclusion, instead of blaming the Editor, authors and publishers should send their books and papers to him more promptly.

Some authors labor under the extraordinary delusion that they cannot be expected to send their publications except in exchange for the Editor's own books. To begin with how could this be possible? The Editor's *Introduction* is a very large, and hence an expensive, work. Thanks to the liberality of the Carnegie Institution, he was able to distribute it to all the scholars who had helped him, but how could he distribute it also to the thousands of scholars whose publications are reviewed and registered in *Isis*? The whole edition of the *Introduction* would be insufficient for such a purpose. Moreover when authors send their books to the Editor, they give nothing to him personally, for he must naturally surrender these books to the reviewers.

When relevant publications are sent to the Editor, they are reviewed or registered in *Isis*, and that review or registration completes the exchange.

The ultimate aims of this undertaking are: (1) to establish the History of Science as an independent discipline; (2) to demonstrate inductively the Unity of Knowledge and the Unity of Mankind; (3) to serve as

(1) These, by the way, he cannot undertake to return as it would involve too much labor. The Editor's usual practice is to present all irrelevant materials to the Widener Library.

a center of information and rallying ground to the scholars engaged in our studies.

Harvard Library, Room 185
Cambridge, Massachusetts.

GEORGE SARTON.
December 14, 1932.

PART I

FUNDAMENTAL CLASSIFICATION (CENTURIAL)

Vth Century B.C.

Bezdechi, St. Das psychopathische Substrat der "Bacchantinnen" EURIPIDES'. *Sudhoffs Archiv für Geschichte der Medizin*, 25, 279-306, 4 fig., 1932. ISIS

IVth Century B.C. (second half)

Birkenmajer, Alexandre. Classement des ouvrages attribués à ARISTOTE par le moyen âge latin. 21 p. (*Prolegomena in Aristotelem latinum consilio et impensis Academiae Polonae litterarum et scientiarum edita*, 1). Cracow, University Press, 1932. ISIS

IIIrd Century B.C. (second half)

Agostini, Amedeo. Notizie sul ricupero dei libri V, VI, VII delle "Coniche" di APOLLONIO. *Period. di mat.*, 11, 293-300, 1931. ISIS

Rome. A. Notes sur les passages des catoptriques d'ARCHIMÈDE conservés par THÉON D'ALEXANDRIE. *Annales de la Société scientifique de Bruxelles*, 52, 30-41, 1932. ISIS

"Résumé : L'Almageste rattache à la réfraction atmosphérique l'agrandissement des astres à l'horizon. THÉON, pour expliquer ce passage, fait appel aux Catoptriques d'ARCHIMÈDE, où l'agrandissement par réfraction est expliqué fort exactement. L'Optique de PTOLÉMÉE, qui n'est malheureusement pas conservée en entier, contient des tables de réfraction dressées expérimentalement; elle fait de l'agrandissement des astres à l'horizon un phénomène physiologique; elle a une théorie assez bonne de la réfraction atmosphérique; elle étudie diverses questions se rapportant au grossissement par réfraction. Tous ces textes rapprochés les uns des autres font naître le soupçon que l'Optique de PTOLÉMÉE nous est parvenue avec des perfectionnements dus aux Arabes. Nous n'avons pas pu résoudre cette question. Il est également impossible de dire ce que contenaient au juste les Catoptriques d'ARCHIMÈDE, et de savoir jusqu'où il avait poussé la théorie de la réfraction."

Ist Century (second half)

Lulofs, H. J. SENECA als medisch censor van zijn tijd. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 125-36, 1932. ISIS

(Menelaus). JACOB BEN MACHIR's version of MENELAUS's work on spherical trigonometry. Translated into English and edited by JEKUTHIEL GINSBURG. *Scripta Mathematica*, 1, 72-78, 1932. ISIS

Hebrew text of the version by JACOB BEN MAḤIR IBN TIBBON (*Introduction*, II, 851) with English version. Judging by the introduction and notes this was done carelessly. G. S.

IInd Century (whole and first half)

Wu, Lu-Ch'iang; Davis, Tenney L. An ancient Chinese treatise on alchemy entitled Ts'an T'ung Ch'i. Written by WEI PO-YANG about 142 A.D., now translated from the Chinese into English by LU-CH'IANG WU. With an introduction and notes by TENNEY L. DAVIS. *Isis*, 18, 210-289, 4 pl., 1932. ISIS

"The present translation of the *Ts'an T'ung Ch'i* is believed to be the first translation into a European language of the entire text of a Chinese treatise on alchemy." (p. 210). The translation was made by WU and revised with his own help by DAVIS; the introduction and notes are the latter's work. "The Introduction is a general survey of our present knowledge of Chinese alchemy. It indicates certain points on which students of the subject are not agreed, and occasionally it offers an interpretation of the evidence. But the present translation of the *Ts'an T'ung Ch'i* is itself also evidence which requires to be interpreted. Some of its indications are pointed out in the Notes, and others will be more apparent when other alchemical texts are available. The Notes are intended particularly for those who may wish to compare Chinese with European alchemy. We have not been able to make out the processes of WEI PO-YANG or to identify many of the substances which are intended by his fanciful names. His obscurity is no greater than that of the mediaeval alchemists; and it will no doubt be possible in the future to identify the White Tiger and the Gray Dragon as it has been possible to identify the Green Lion and the White Lady of the Latin writers." (p. 212).

The translated text covers 32 p., the introductions and notes, 48. There is an index of Chinese words. This paper may be said to open a new chapter in the study of alchemy. G. S.

IInd Century (second half)

Lippmann, Edm. O. von. Zur Geschichte der angeblichen Entstehung von Wasser aus Luft. *Chem.-Ztg.*, 55, 681, 1931. ISIS

Apropos of LUCIAN OF SAMOSATA.

Meyerhof, Max; Schacht, Joseph. GALEN. Über die medizinischen

Namen arabisch und deutsch herausgegeben. 43 p., 21 p. (*Abhandlungen der Preussischen Akademie der Wissenschaften*. Jhrg. 1931). Berlin, DE GRUYTER, 1931. ISIS

Reviewed by G. BERGSTRÄSSER, *OLZ*, 35, 331-38, 1932.

Meyerhof, Max. Über das Leidener arabische Fragment von GALENS Schrift Über die medizinischen Namen. 26 p. (*Sitzungsber. der Preussischen Akademie der Wissenschaften*, 1928). Berlin, DE GRUYTER, 1928. ISIS

Reviewed by G. BERGSTRÄSSER, *OLZ*, 35, 331-38, 1932; see *Isis*, 13, 146.

IIIrd Century (whole and first half)

Dept, Gaston Gérard. Notes sur la Tabula Peutingeriana. *Revue belge de philologie et d'histoire*, 10, 997-1011, 1931. Bruxelles, 1932. ISIS

Étude d'ensemble sur les travaux récents, surtout ceux de W. KUBITSCHEK et J. R. WARTENA. 1. La forme de la T. P.; 2. Les noms de lieu; 3. Les vignettes; 4. A propos d'une nouvelle édition. L'auteur esquisse les travaux préliminaires qui ont été déjà faits et ceux qui restent à faire. G. S.

Tucci, Giuseppe. Two hymns of the Catuḥ-stava of NÂGÂRJUNA. *Journal of the Royal Asiatic Society*, 309-25, 1932. ISIS

VIth Century (whole and first half)

Davis, Tenney L.; Wu, Lu-Ch'iang. T'AO HUNG-CHING. *Journal of Chemical Education*, 9, 859-62, fig., 1932. ISIS

T'AO HUNG-CHIN (451-536; see *Intro.*, I, 436) "lived at a time when alchemy had already been practiced in China for seven or eight hundred years. In his time the art of preparing the pill of immortality already had its authentic and its legendary history and heroes. The practitioners of the art called themselves, as they also called the art, by the name of Huang Lao, a combination of the names of HUANG TI, the Yellow Emperor, legendary founder of alchemy, and of the name of LAO TZU or LAO CHÜN, the Sage, founder of the Taoist doctrines which supplied the philosophical basis of their quest. The alchemical writings of LIU AN or HUAI NAN TZU (died 122 B.C.), of WEI PO-YANG (flourished about 142 A.D.), and of KO HUNG or PAO P'U TZU (about 281-361 A.D.) had already attained the authority of classics. The *Lieh Hsien Ch'üan Chuan* (Complete Biographies of the Immortals), upon which the following account of T'AO HUNG-CHING is largely based, gives a circumstantial description of the man and of the events of his life, a description which differs in this respect from those in the same work of HUANG TI, LIU AN. and WEI PO-YANG which appear to be based upon tradition and convey but little idea of the individuality of the man to which they relate."

VIIth Century (whole and first half)

Muḥammad the Prophet (*Introd.*, I, 464). The Prophet was born not c. 570, but c. 580, if it is true that when he died in 632 he was not much more than fifty. See H. LAMMENS : L'âge de M. et la chronologie de la Sîra (*Journal asiatique*, 1910). G. S. ISIS

VIIIth Century (second half)

Ruska, Julius. The history and present status of the JABER problem. *J. Chem. Educ.*, 6, 1266-76, 1 facs., 1929. ISIS

IXth Century (whole and first half)

Faddegon, J. M. Notice critique sur le Firdausu l-ḥikmat or Paradise of wisdom de 'ALI B. RABBAN AL-ṬABARI, edited by Z. SIDDIQI. *Journal asiatique*, 218, 327-52, 1931. ISIS

This is the text which was elaborately analyzed for us by M. MEYERHOF (*Isis*, 16, 6-54, 1931).

Meyerhof, Max. 'ALI IBN RABBAN AṬ-ṬABARI, ein persischer Arzt des 9. Jahrhunderts n. Chr. *Z. d. morgenländ. Ges.*, 10, 38-68, 1931. ISIS

Reviewed by MÜLLER, *Mitt. zur Geschichte der Medizin*, 31, 147, 1932.

Schachter. Un médecin perse du IX^e^ siècle, d'origine chrétienne, ALI IBN RABBAN AT TABARI. *Bulletin de la Société française d'histoire de la médecine*, 26, 165-70, 1932. ISIS

Xth Century (whole and first half)

Farmer, Henry George. The influence of AL-FARABI's "Ihsa' al-'ulum" (De scientiis) on the writers on music in Western Europe. *Journal of the Royal Asiatic Society*, 561-92, 1932. ISIS

"The intrinsic value of the *Iḥṣâ' al-'ulûm* to the European theorist in music was inconsiderable. Its real use was that it called attention to the 'Arabian Sciences,' as they were called, which European students were busy acquiring."

Hamui, Robert (O.F.M.). ALFARABI's philosophy and its influence on scholasticism. 86 p. Sydney, PELLEGRINI, 1928. ISIS

This Australian work had thus far escaped my attention, which is the author's fault as much as my own. Published with ecclesiastical imprimatur, it is under a modest appearance a very valuable study. Fra ROBERT, whom I take to be a Syrian (his Arabic name is probably Ḥamawī, meaning he of Ḥamā), has made good use of *some* of the Arabic writings of AL-FĀRĀBĪ, (Collection of eight philosophical treatises, Cairo 1907; Political regime,

Cairo?; The knowledge of God in Traités inédits de philosophes arabes, Beirut, 1911). He analyzes AL-FĀRĀBĪ's views subject by subject in the classical order of scholastic philosophy. He shows that AL-FĀRĀBĪ had admirably solved the problem of universals with the formula : Universale est unum de multis et in multis (that is, that the universal is immanent in the individual), and that he anticipated ST. THOMAS' philosophy in various points, e.g., in the real distinction between essence and existence in created things yet not in God. He sums up AL-FĀRĀBĪ's views as follows (p. 81) : " In the philosophy of *being* he tells us that reality is being in becoming."... " In the philosophy of *knowing* he gives the history of our speculative intellect which includes the capacity of assuming various successive forms. In the philosophy of *acting* he shows how every human activity tends to happiness. This happiness is the cause through which man associates with his fellow creatures, creating the state. The state-type is the universal state, common to all people and social groups. Now from all that we have said, who does not realise how ALFARABI is pervaded by a deep unifying urge in building up his philosophy? And he, to satisfy such a need, co-ordinates and converges all different parts of his philosophy to one point in which the one and the many, being and becoming, the knowing and knowable reality, necessity and liberty, meet and agree in an infinite spirituality constituting the living centre of every being." G. S.

Suhrāb. Kitāb 'aja'ib el-aqālīm es-sab'a. Arabic text edited by HANS V. MŽIK. XVII+201 p. Vienna, HARRASSOWITZ, 1930. ISIS

This is the Arabic text dealt with in my *Introduction*, I, 635, and there erroneously ascribed to IBN SERAPION after the catalogue of MSS. of the British Museum. SUHRĀB's book written sometime between 902 and 945 is not concerned with wonders but with plain geographical facts in the manner of the *Ṣūrat al-arḍ* of AL-KHWĀRIZMĪ (*Introduction*, I, 563). G. S.

XIth Century (whole and first half)

al-Bīrūnī (*Introd.*, I, 707-709). En la pag. 187 del vol. II de *Introduction to the History of Science* se atribuye a ABRAHAM IBN EZRA la traducción hebraica del Comentario de AL-BIRUNI a las Tablas de AL-KHWARIZMI. Pero hay que notar que la atribución a AL-BIRUNI de este Comentario — atribución sugerida primeramente por H. SUTER en *Biliotheca Mathematica*, 3. Folge, Bd. IV, p. 127-29, 1903, aceptada como probable por otros autores, y dada ya como cosa segura por SUTER en su edición de las Tablas de AL-KHWARIZMI, p. 51 — no es exacta. El historiador IBN SĀ'ID de Toledo en su obra *Tabaqat al-umam* (Beyrut, p. 57, 1912) nos dice claramente que el autor del Comentario a las Tablas de AL-KHWARIZMI, es AḤMAD IBN AL-MOTSANA IBN ABDU-L-KARIM. La grafía de este nombre dada por IBN SĀ'ID coincide con la de la traducción hebraica, obra de IBN EZRA, y por lo tanto se corrobora su exactitud. El Prof. A. C. NALLINO ya advirtió la cita de IBN SĀ'ID, en las adiciones a su obra árabe *Historia*

de la astronomía entre los árabes durante la Edad Media, p. 333 (Roma, 1912). J. M. V. ISIS

Wilkinson, J. V. S. The Shahnamah of FIRDAUSI. The book of the Persian kings, with 24 illustrations from a fifteenth century Persian manuscript in the possession of the Royal Asiatic Society. Introduction on the paintings by LAURENCE BINYON. XX+92 p., 24 pl. London, Oxford University Press, 1931. ISIS

Reviewed by A. T. W., *Journal of the Royal Asiatic Society*, 706-08, 1931.

XIth Century (second half)

'Alî ibn Khalaf of Toledo. Note to *Introduction*, II, 836. The Arabic author of the treatise on the " lamina universal " was ABŪ-L-ḤASAN 'ALĪ IBN KHALAF IBN AḤMAD of Toledo, a companion of AL-ZARQĀLĪ. He composed it for the king AL-MA'MŪN OF TOLEDO (who ruled from 1037 to 1074), not as SUTER erroneously says (*Mathematiker der Araber*, 1900, note 43, p. 214) for the king AL-MA'MŪN OF CORDOVA (1018-21). See IBN ṢA'ID AL-ANDALUSĪ : *Ṭabaqāt al-umam* (Beyrouth, 1912, p. 75.) J. M. V. ISIS

Colin, G. S. et **Lévi-Provençal, F.** Un manuel hispanique de ḥisba. Traité d'ABŪ 'ABD ALLÂH MUḤAMMAD B. ABĪ MUḤAMMAD AS-SAQAṬĪ de Malaga sur la surveillance des corporations et la répression des fraudes en Espagne musulmane. Texte arabe, introduction, notes linguistiques et glossaire. XIII+72 p., 74 p. en arabe, 4 pl. (*Publications de l'Institut des Hautes Etudes marocaines*, 21). Paris, LEROUX, 1931. ISIS

Cette édition du premier traité occidental de ḥisba complètera notre connaissance de cette fonction musulmane : la surveillance des mœurs, et surtout des marchés. C'est un guide pour le fonctionnaire chargé de ce service, le muḥtasib (d'où l'espagnol, almotacen). J'ai signalé un livre oriental du même genre dans mon *Introduction* (vol. 2, 463), mais il y en a trois autres. L'auteur du présent traité, ABŪ 'ABDALLĀH MUḤAMMAD IBN ABĪ AḤMAD AL-SAQAṬĪ exerça les fonctions de muḥtasib à Malaga, sans doute à la fin du XI^e^ siècle ou dans la première moitié du XII^e^. « Il écrivit son traité, à un moment où il n'était plus muḥtasib, pour obéir à une suggestion de ses amis, qui l'incitaient à rédiger une sorte de manuel qui contînt ' l'histoire des fraudeurs parmi les marchands et les artisans qui sont sur les marchés, leurs tromperies en matière de mesures et de poids, les moyens qu'ils emploient pour déprécier les marchandises, les ruses qui leur sont coutumières dans les transactions, leur dissimulation dans leur façon de présenter et de traiter les affaires '; qui montrât aussi la violation à peu près permanente des règlements de la ḥisba et l'incompétence fréquente des magistrats chargés de cet office. Le traité d'AS-SAQAṬĪ est divisé en huit chapitres, précédés d'une

introduction faite de considérations générales sur l'application de la ḥisba aux premiers temps de l'islamisme. Ils traitent successivement des poids et des mesures, des peseurs et des mesureurs, des fariniers, des boulangers, des bouchers, des restaurateurs, des parfumeurs, des droguistes, des marchands d'esclaves, des courtiers et des fabricants et vendeurs de produits manufacturés. » (p. ix-x). G. S.

Kasir, Daoud S. The algebra of OMAR KHAYYAM. IV+126 p., figs. (*Teachers College, Columbia University, contributions to education*, no. 385). New York, 1931. ($ 2.00). ISIS

To quote from the preface: "The present work presents for the first time in English a translation of the algebra of OMAR KHAYYAM. It is taken from an Arabic manuscript in the library of Professor DAVID EUGENE SMITH of Teachers College, Columbia University. Special effort has been made to render the translation as close as possible to the original work, but in places where such literal translation may confuse the English reader a free rendering of the expression is given to conform with modern English phraseology; at the same time this procedure is supplemented by explanatory notes. In addition, the algebraic solutions of the problems as well as the geometrical demonstrations of the theorems have been rendered into modern symbolism. Particular attention has also been given to tracing the influence of earlier Greek and Arab achievements in the field of mathematics upon the present work of OMAR KHAYYAM and in turn the influence of his work upon mathematical work in Persia in the Middle Ages. Finally, the writer has endeavored to show OMAR KHAYYAM's systematic method and distinctive contribution to the science of algebra." This work should be especially valuable "to those who are interested in the present tendency of correlating algebra and geometry, as it recounts the historical development of the transformation of the geometric algebra of the Greeks to the analytic form—a tendency characteristic of Arabian mathematicians."

This is indeed an important addition to the mathematical sources available to English students. Its main deficiency is the inconsistency of its transliteration. The author says that he followed the form used by SUTER—which would be bad enough inasmuch as SUTER's transliteration is adapted to the German language rather than to the English one; but in fact he does nothing of the kind! The first line contains at least three mistakes on any basis, and so on. It would be much better not to attempt to transliterate exactly than to do it so badly. G. S.

Li² Ming³-chung⁴ (6884, 7946, 2876). Methods of architecture (*Ying² tsao⁴ fa² shih⁴*) (13305, 11624, 3366, 9984). 8 vols. 1230 p. in Chinese. Shanghai, Commercial Press, 1930 ($ 76, postage extra). ISIS

Monumental work on Chinese architecture, composed by LI MING-CHUNG, or LI CHIEH, born c. 1065 at Kuancheng, near the then capital Kaifeng in Honan. The work was completed by him in 1100. It was first printed from woodblocks in 1103. LI died in 1110. His book was recut and reprinted in 1145. These early Sung editions have now vanished except for two fragments, but the text is known through MS. copies. A photo-

lithographic edition was made from a transcript in 1920. A new edition in the Sung style was published in 1925 after seven years of preparation, and was soon out of print; the present edition is a reimpression from the same blocks.

The work was divided into 36 parts or " rolls "; or 34 chapters plus introduction and table of contents. " Chaps. 1 and 2. Definitions of terms. Chaps. 3-15. Directions concerning the various classes of works, including foundation and skeleton work, masonry, large and small woodwork, bamboo work, carving and painting, tile, brick, and plaster work, etc. Chaps. 16-25. Directions concerning the calculation of units of work for the various classes of works as mentioned above. Chaps. 26-28. Directions concerning the choice and use of materials. Chaps. 29-34. Illustrations for woodwork, carving, and painting."

For further analyses of this fundamental Chinese publication, see W. PERCEVAL YETTS in *Burlington Magazine* March 27, 1925, and in the *Bulletin of the School of Oriental Studies*, vol. 4, also P. DEMIÉVILLE in *Bull. École franç. d'Extrême-Orient*, 25, 213-64, 1925. G. S.

Ross, E. D.; Gibb, H. A. R. The earliest account of 'UMAR KHAYYĀM. *Bulletin of the School of Oriental Studies*, London Institution, 5, 467-73, 1929. ISIS

" It has hitherto been supposed that the earliest allusion to 'UMAR KHAYYĀM is that contained in the *Chahār maqāla* of NIZĀM-I 'ARŪḌĪ, which was written in A.H. 552, and the second allusion in point of date that contained in the *Nuzhat al-arwāḥ* of MUḤAMMAD SHAHRAZŪRĪ, written about the middle of the seventh century."... " Now this account of 'UMAR was taken almost verbatim, but with several extensive omissions, from the *Ta'rīkh ḥukamā' al-Islām* of ẒAHĪR AD-DĪN AL-BAYHAQĪ, which was composed before A.H. 549, and therefore antedates by some years the notice in the *Chahār maqāla*. We are indebted to Professor WEIL for the kind loan of the unique manuscript of this work, now in the Berlin University Library (Petermann, ii, 737), from which the following notice has been extracted." Arabic text and English translation. G. S.

'Ubaidallāh ibn Khalaf al-Istajī (Note to *Introduction*, II, 537). The Arabic author of the Book of the Crosses of which an elaborate analysis appeared in *Isis* (14, 77-132, 1930) is possibly identical with ABŪ MARWĀN UBAIDALLĀH AL-ISTAJĪ, a younger contemporary of IBN ṢA'ID AL-ANDALUSĪ who praises him considerably in his *Ṭabaqat al-umam* (Beirut edition, p. 86, 1912). J. M. V. ISIS

XIIth Century (whole and first half)

Dept, Gaston Gerard. Een Vlaamsche kolonie in Wales (1107). *Annales de la Société d'Emulation de Bruges*, 74, 16-31, 1931. ISIS

Apropos of a Flemish colony in Wales, whose presence has left many traces in that country and in the Welsh language. G. S.

Munro, Dana Carleton. A crusader. *Speculum*, 7, 321-35, 1932. ISIS

Apropos of FULCHER OF CHARTRES.

Plato of Tivoli (*Introd.*, 2, 177-79). The *Liber embadorum* was edited by M. CURTZE : Der Liber embadorum des SAVASORDA in der Übersetzung des PLATO VON TIVOLI (*Abhandl. zur Geschichte der mathem. Wiss.*, Heft 12, 183 p., Leipzig, 1902). See also STEINSCHNEIDER's article in *Bibliotheca Mathematica*, 10, 34-38, 1896, and ENESTRÖM's *ibidem*, 11, 332-33, 1911. R. C. A. ISIS

Scalinci, Noè. BENVENUTO GRASSO (o GRAFEO) e l'oftalmiatria della scuola salernitana. *Rivista di Storia delle Scienze Mediche e Naturali*, 22, 399-416, 1931. ISIS

Thompson, Daniel V., jr. The *Schedula* of THEOPHILUS PRESBYTER. *Speculum*, 7, 199-220, 1932. ISIS

XIIth Century (second half)

Furlani, Giuseppe. Testi religiosi dei Yezidi. Traduzione, introduzione e note. VIII+124 p. (*Testi e documenti per la storia delle religioni*, 3). Bologna, ZANICHELLI, 1930. ISIS

Reviewed by H. A. WINKLER, *OLZ*, 35, 582-85, 1932; by M. GASTER, *Journal of the Royal Asiatic Society*, 218-19, 1932; by KARL HADANK, *DLZ*, 3, 1837-41, 1932.

Gibb, H. A. R., ed. The Damascus Chronicle of the Crusades. Extracted and translated from the Chronicle of IBN AL-QALĀNISĪ. 368 p. (*University of London Historical Series*, no. 5). London, LUZAC, 1932. ISIS

Reviewed by EINAR JORANSON, *Speculum*, 7, 432-35, 1932; by A. S. T., *Journal R. As. Soc.*, 1054-56, 1932; by D. C. MACDONALD, *Amer. Histor. Rev.*, 38, 146, 1932.

Krajewski, Léon. Le culte de Satan. *Mercure de France*, 240, 87-123, 1932. ISIS

Les hypothèses sur l'origine du « Yezidisme » (SARTON : *Introduction*, 2, 336), qui ne compte plus, à l'heure actuelle, qu'environ quarante mille fidèles disséminés à Mossoul, dans les provinces d'Alep, de Bitlis, de Van, dans la Syrie septentrionale, dans le Kurdistan, en Perse. Leurs livres sacrés : *Kitab el-Djelva* (le livre de la révélation), *Masahf Rech* (le livre noir). Leur grand saint : Cheikh ADDI, mort en 1162; son sanctuaire est à une centaine de kilomètes au N.E. de Mossoul. Hiérarchie religieuse. Croyances, rites, fêtes; lois et coutumes matrimoniales; cérémonies et coutumes funéraires.

Le Yezidisme est composé d'articles de foi empruntés un peu à toutes les religions. Cette étude est le résumé d'une enquête faite par l'auteur en Mésopotamie, dans le Kurdistan et la Turquie d'Asie, complétée par la lecture des travaux les plus récents sur le sujet. Les accusations de pratiques honteuses et de principes grossiers colportés contre cette religion ne sont pas justifiées; plus que certaines autres, elle est basée sur des sentiments d'honnêteté et de fraternité; ses adeptes sont sincères et de bonne foi. L. G.

Somogyi, Joseph de. The " Kitāb al-muntaẓam " of IBN AL-JAUZĪ. *Journal of the Royal Asiatic Society*, 49-76, 1932. ISIS

Brief biography of IBN AL-JAUZĪ (see *Introduction*, II, 362), list of MSS. of the *Kitāb al-muntaẓam*, its contents and character, its authorities, concordance between it and the *Ta'rīkh al-rusul wal-mulūk* of AL-ṬABARĪ. G. S.

XIIIth Century (whole and first half)

Fibonacci (note to *Introduction*, II, 11, 612). The *Practica geometriae* of FIBONACCI was derived from EUCLID's lost book on the Divisions of figures only in an indirect way. FIBONACCI's main source was the *Liber embadorum* of ABRAHAM BAR ḤIYYA. See the Catalan version of it by J. MILLÀS I VALLICROSA. G. S. ISIS

Mayer, L. A. Zum Titelblatt der Automata Miniaturen. *OLZ*, 35, 165-66, 1932. ISIS

Apropos of the automata miniatures illustrating a MS. of AL-JAZARĪ's mechanical treatise (*Introduction*, II, 632-33). The author concludes that the MS. was written in Egypt about the year 1352. This confirms the date given in my *Introduction* (1354). G. S.

Pearl, Raymond. On the alleged lethal effects of sexual continence in the Holy Land. *Human Biology*, 3, 577-85, 1 fig., 1931. ISIS

Apropos of the *Itinerarium peregrinorum et gesta regis Ricardi* (book VI, chapter XXXV) wherein the author states that 100000 Christians perished in that pilgrimage because of sexual abstinence ! G. S.

Pflaum, Heinz. Sortes, Plato, Cicero. Satirisches Gedicht des dreizehnten Jahrhunderts. *Speculum*, 6, 499-533, 1931. ISIS

Walsh, James J. Medicine in a popular medieval encyclopedia. *Annals of Medical History*, 4, 273-82, 2 fig., 1932. ISIS

XIIIth Century (second half)

Aldobrandin of Siena (*Introd.*, II, 1083-84). Six pictorial cards printed in colours. Set B 35. London, British Museum (n.d., bought in 1932). ISIS

The six subjects of mediaeval life illustrated in this series are taken from Sloane MS. 2435, executed in N.E. France or Flanders in the late thirteenth century and containing " Le Régime du Corps," an encyclopaedic treatise on health by ALDOBRANDINO OF SIENA, followed by the poem " L'Ymage du Monde," from which the last card of the series is taken. G. S.

Bacon, Roger. Opera hactenus inedita ROGERI BACONI, fasc. X., Questiones supra libros prime philosophie ARISTOTELIS (Metaphysica I, II, V-X). Edited by R. STEELE and F. M. DELORME. XXXII+ 360 p. Oxford, University Press, 1930. ISIS

Reviewed by JAMES MARSHALL CAMPBELL, *Speculum*, 7, 159-61, 1932.

(Bacon, Roger). The mirror of alchemy of ROGER BACON. Translated into English by TENNEY L. DAVIS. *Journal of Chemical Education*, 8, 1945-53, 1931. ISIS

" The *Speculum Alchemiae* or Mirorr of Alchemy which is ascribed of ROGER BACON (1214-1292) is probably not the work of that man, but does belong to his time, and was held in as high repute by later alchemists as if he had written it. It appears to be a paraphrase of an earlier Arabic treatise on alchemy or a summary of a number of such treatises. Portions of it are identical with portions of AVICENNA's Little Book of the Mineral Stone. It sets forth the sulfur-mercury doctrine of the composition of the metals in a manner which makes it clear that the author was acquainted experimentally with the substances. It describes the alchemical process in which the materials are heated in a tightly closed vessel, gently at first and then more strongly, which process, curiously or perhaps significantly, is the same as that described by the Chinese alchemist, WEI PO-YANG, in the second century A.D. The work was printed in Latin in the earliest printed books on alchemy, was later translated into the various European languages, and still had currency and authority as late as the eighteenth century."

Ivanow, W. An Ismailitic work by NASIRU'D-DIN TUSI. *Journal of the Royal Asiatic Society*, 527-64, 1931. ISIS

Apropos of a Persian MS. entitled *Rauḍatu' l-taslīm* ascribed to the great mathematician NĀṢIR AL-DĪN AL-ṬŪSĪ (see *Introduction*, II, 1001-13), who became under duress and probably remained an Ismā'īlī. The treatise is analyzed. G. S.

Moule, A. C. MARCO POLO. *Journal of the Royal Asiatic Society*, 603-25, 1932. ISIS

Elaborate review of various recent publications on MARCO POLO. G. S.

Nunemaker, J. Horace. An additional chapter on magic in mediaeval Spanish literature. *Speculum*, 7, 556-64, 1932. ISIS

Dealing mainly with the Lapidario of ALFONSO EL SABIO. G. S.

Polo, Marco. The travels of MARCO POLO. Translated into English

from the text of L. F. BENEDETTO, by ALDO RICCI. With an introduction and index by Sir E. DENISON ROSS. XVIII+438 p. London, ROUTLEDGE, 1931. ISIS

Reviewed by C. E. A. W. OLDHAM, *Geographical Journal*, 79, 69-70, 1932. "Professor BENEDETTO in 1928 edited MS. Fr. 1116 of the Bibliothèque Nationale under the title 'Il Milione di Marco Polo,' and subsequently made a modern Italian translation with additions from other texts, and corrections of obvious errors in matters of fact. In the present English translation, these errors have been restored to the original readings. The index is very complete as regards names of places and people, and serves as a glossary of many oriental terms." C. W. A.

Singer, Dorothea Waley. Alchemical writings attributed to ROGER BACON. *Speculum*, 7, 80-86, 1932. ISIS

XIVth Century (whole and first half)

Froehner, Reinhard. Die Tierheilkunde des ABU BEKR IBN BEDR. *Vet.-hist. Jb.*, 6, 1-150, 1931. ISIS

German translation of the French version by PERRON (Paris, 1852-1860). See *Isis*, 14, 481. Reviewed by SCHMUTZER, *Mitt. zur Geschichte der Medizin*, 31, 79, 1932.

Guerra, G. Del. Ancora intorno a "La morte di ARRIGO VII." *Rivista di Storia delle Scienze Mediche e Naturali*, 14, 24-27, 1932. ISIS

Pullé, Giorgio (edit.). Viaggio del Beato ODORICO DA PORDENONE. 256 p. Milan, ALPES, 1931. ISIS

Reviewed by C. E. A. W. OLDHAM, *Geographical Journal*, 79, 243-44, 1932. "The text is that published in *Sinica Franciscana*, by A. VAN DEN WYNGAERT: that is, Codex no. 343 (20) of the Biblioteca Comunale in Assisi, containing the version of GUGLIELMO DA SOLAGNA." C. W. A.

Silverstein, H. Theodore. DANTE and MACROBIUS. *Times Literary Supplement*, p. 789, London, October 27, 1932. ISIS

Silverstein, H. Theodore. Two notes on DANTE's Convivio, IV, 23. *Speculum*, 7, 547-51, 1932. ISIS

DANTE's reference to ALBERTUS MAGNUS. DANTE's reference to the horses of the sun.

Somogyi, Joseph de. The Ta'rīkh al-islām of ADH-DHAHABĪ. *Journal of the Royal Asiatic Society*, 815-55, 1932. ISIS

Introduction. Bio- and bibliography of the author. MSS. of his principal work, the *Ta'rīkh al-islām*. Analysis of it: A. general narrative: *a.* political history, *b.* local history, *c.* wonderful events. B. biographies. G. S.

Thorndike, Lynn. Calculator. *Speculum*, 7, 221-30, 1932. ISIS

Apropos of the *Calculationes* of RICHARD SUISETH.

XIVth Century (second half)

Ginsburg, Jekuthiel. An unknown mathematician of the fourteenth century. *Scripta Mathematica*, 1, 60-62, 1932. ISIS

Apropos of the Majorcan mathematician EN BELLSHAM EPHRAIM GERONDI, who lived sometime between the years 1361 and 1440. G. S.

Holand, Hjalmar R. The Kensington stone : a study in pre-Columbian American history. VIII+316 p. Ephraim, Wisconsin, privately printed, 1932. ISIS

Reviewed by G. M. GATHORNE-HARDY, *Geographical Journal*, 79, 437-38, 1932. " The stone was discovered in 1898 at Kensington, Minnesota under the roots of a tree. It bears a long runic inscription concerning Swedes and Norwegians, and is dated 1362. Mr. HOLAND shows this date and this personnel to be appropriate to an expedition despatched by MAGNUS ERIKSSON : he has made out a case for the careful reconsideration of the current verdict of forgery." C. W. A.

Schmidt, Nathaniel. IBN KHALDUN. Historian, sociologist and philosopher. 67 p. New York, Columbia University Press, 1930.

1. The discovery of IBN KHALDUN; 2. The historian; 3. The philosopher of history; 4. The sociologist; 5. The man; 6. Extant manuscripts; 7. Editions; 8. Translations.

" IBN KHALDUN would not have understood the statement that he was the founder of sociology rather than of scientific history. He regarded himself as the discoverer of the science of history precisely because he conceived of history as the science dealing with all the social phenomena of man's life." (p. 27)... " IBN KHALDUN as a man is most clearly and most significantly revealed in the great work he left behind. Here he lives more truly than in the turbulent activities of his diplomatic career. His nature is reflected in his observations on human society, his rigorous demand that it be studied comprehensively and with scientific accuracy, and his faithfulness, so far as time and circumstances permitted, in meeting this requirement. He is a solitary figure, towering above his age, yet to be explained in the way he himself regarded as proper in the interpretation of every historic phenomenon. The law of growth and decay of social groups which he discerned cast him into oblivion; the same law has led to his discovery and the recognition of his genius." (p. 45).

Walker, Frederic. GEOFFREY CHAUCER and alchemy. *Journal Chem. Ed.*, 9, 1378-85, 1932. ISIS

An account of CHAUCER's conception of alchemy and an abridged translation into modern English of the Canon's Yeoman's Tale. A glossary of the alchemical terms used by CHAUCER. T. L. D.

XVth Century (whole and first half)

Hulme, E. Wyndham. German wild-fire trials at Oxford in 1438, with appendices : (1) on the sea-fire of KALLINICUS, A.D. 673 ; (2) on an early notice of saltpetre. *Transactions of the Newcomen Society*, 10, 89-99, 1929-30. ISIS

This doubtful notice of saltpetre is from a Lucca MS. of *Compositiones ad tingenda* (see *Introduction*, I, 533). G. S.

Maroger, Jacques. Sur la reconstitution de la technique picturale de JEAN VAN EYCK. *Revue générale des sciences*, 43, 86-89, 1932. ISIS

XVth Century (second half)

Bijl, W. F. Th. van der. Benoemingsbesluit van een gemeentegeneeskundige te Veere in het jaar 1486. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 138, 1932. ISIS

Nierenstein, M. ; Chapman, P. F. Enquiry into the authorship of the Ordinall of Alchimy. *Isis*, 18, 290-321, 4 pl., 1932. ISIS

" It is evident from the foregoing that the " biographies " of THOMAS NORTON in which he is described as a member of the Bristol NORTONS are fundamentally incorrect, since it is impossible for any one NORTON to have been at the same time the son of THOMAS I and the great-grandfather of SAMUEL. Individually examined, we can say with certainty that THOMAS II did not write the *Ordinall*, since his will was proved in 1449. As to THOMAS NORTON IV, we know for certain that he was dead in 1479 and it is extremely unlikely that he was alive in 1477, when the *Ordinall* was begun. There remains therefore THOMAS III as a possible author of the *Ordinall*. As far as we have been able to ascertain, he has no credentials whatever for it, unless he was a hypocrite as well as a thoroughly disreputable character. Moreover, we have found no direct evidence to connect the *Ordinall* with either THOMAS III or THOMAS IV."

XVIth Century (whole and first half)

B. — *Physical sciences and technology*

Achelis, J. D. Über den Begriff der „Alchimie" in der paracelsischen Philosophie. *Bl. f. d. Philos.* 3, 99-106, 1929. ISIS

Achelis, J. D. Zur Grundstruktur der paracelsischen Naturwissenschaft. *Kyklos*, 1, 44-51, 1928. ISIS

Sviatski, D. The astrologer NIKOLAI LUBCHANIN and the almanachs

in XVIth-century Russia. *Bull. Inst. Lesshaft*, 15, 45-55, 1929 (In Russian). ISIS

C. — *Natural sciences*

Barlow, Roger. A brief summe of geographie. Edited with an introduction and notes by E. G. R. TAYLOR. LVI+210 p. (*The Hakluyt Society*, second series, no. 69, 1931). London, QUARITCH, 1932. ISIS

Langlois, Colonel ; **Roncière, Ch. de la.** Les portulans français. 20 p., 30 facs. (*Documents paléographiques, typographiques, iconographiques*, publiés sous la direction de HENRY JOLY, 8e fascicule.) Lyon, Bibliothèque, 1929. ISIS

Reviewed by GABRIEL FERRAND, *Journal des Savants*, 394-400, 1931.

Magnaghi, Alberto. Il planisfero del 1523 della Biblioteca del Re in Torino, la prima carta del mondo costruita dopo il viaggio di MAGELLANO, Unica copia conosciuta di carta generale ad uso dei piloti dell' epoca delle grandi scoperte. 92 p., 7 pl. Firenze, LANGE, 1929. ISIS

Roncière, Charles de la. JACQUES CARTIER et la découverte de la Nouvelle-France. 244 p., 5 illus., map. (*Les grandes figures coloniales*, 2). Paris, PLON, 1931. ISIS

Strunz, Franz. Mensch und Natur in der Weltanschauung des PARACELSUS. *Acta Paracelsica*, H. 5, 126-42, 1932. ISIS

Taylor, Eva Germaine Rimington. Tudor geography, 1485-1583. IX+290 p., 16 pl. London, METHUEN, 1930. ISIS

D. — *Medical sciences*

Bail, Dr. Un chirurgien urologiste au XVIe siècle : PIERRE FRANCO. *Bulletin de la Société française d'histoire de la médecine*, 26, 204-10, 1932. ISIS

Bainton, Roland H. The smaller circulation. *Arch. Gesch. Med.*, 24, 371-74, 1931. ISIS

Paracelsus. Leben, Künste und Meinungen des viel beschriebenen THEOPHRASTUS PARACELSUS VON HOHENHEIM. Nach den Quellen erzählt von WILL-ERICH PEUCKERT. Jena, DIEDERICHS, 1928.

Reviewed by F. M. G. DE FEYFER, *Bijdragen tot de geschiedenis der geneeskunde*, 11, 10, 1931.

Paracelsus. Sämtliche Werke. 1. Abtlg. : Medizinische, naturwissenschaftliche und philosophische Schriften. Hrsg. v. KARL SUDHOFF. Bd. 5 : Baseler Wintervorlesungen 1527/1528. Über tartarische Erkrankungen, über spezielle Pathologie und Therapie (Paragraphen), über Wunden und Wundbehandlung. Entwürfe zu einer polemisch gehaltenen Chirurgie. XXII+551 p., 9 fig. München, OLDENBOURG, 1931. ISIS

Patten, Nathan Van. Obstetrics in Mexico prior to 1600. *Annals of Medical History*, 4, 203-12, 2 fig., 1932. ISIS

Schmid, Alfred. Ein wertvoller medizinischer Sammelband aus der ersten Hälfte des 16. Jahrhunderts. *Schweizer Sammler*, 4, 16 p., 3 facs., 1930. ISIS

Reviewed by HABERLING, *Mitteilungen zur Geschichte der Medizin*, 30, 276, 1931.

Sticker, Georg. Der Arzt PARACELSUS. *Med. Welt*, 5, 1302-04, 1338-39, 1407-10, 1931. ISIS

Taddei, Antonio. La località ove ANDREA VESALIO tenne in Pisa la sua lezione di anatomia. *Boll. Ist. Stor. Ital. Arte Sanit.*, 11, 166-70, 1931. ISIS

Tanfani, Gustavo. Gli attributi somato-psichici del carattere anormale secondo CARDANO. *Rivista di Storia delle Scienze Mediche e Naturali*, 22, 433-40, 1931. ISIS

Terson, A. Sur FRACASTOR, son iconographie et le traité de la contagion. *Bulletin de la Société française d'histoire de la médecine*, 26, 171-76, 1 fig., 1932. ISIS

Vorwahl, H. Die Arznei des PARACELSUS. *Biolog. Heilkunst*, 12, 3 p., 1931. ISIS

E. — *Alia*

Bulletti, Enrico. Itinerarium urbis Romae di Fra MARIANO da Firenze, con introduzione e note illustrative. XXI+250 p., fig. (*Studi di Archeologia Cristiana*, pubblicati per cura del Pontificio Instituto di Archeologia Cristiana, II). Rome, 1931. ISIS

Reviewed by LÉON HOMO, *Journal des Savants*, 325-26, 1932; and by CH. HÜLSEN, *DLZ*, 3, 561-64, 1932.

Jordan, Wilbur Kitchener. The development of religious toleration in England from the beginning of the English Reformation to the death of Queen ELIZABETH. London, ALLEN and UNWIN, 1932. ISIS

Manuel, II, King (of Portugal, 1889-). Early Portuguese books, 1489-1600, in the library of his Majesty the King of Portugal. Three volumes. Vol. II, 1540-1569, XII+817 p. London, Maggs, 1932. ISIS

Vol. 1 (1489-1539), 1929.

(More, Sir Thomas). The life and death of Sir THOMAS MOORE, knight, sometimes Lord High Chancellor of England, written in the tyme of Queene MARIE. By NICHOLAS HARPSFIELD, and now edited from eight manuscripts with collations, textual notes, &c., by ELSIE VAUGHAN HITCHCOCK. With an introduction on the continuity of English prose from ALFRED to MORE and his school, a life of HARPSFIELD, and historical notes by R. W. CHAMBERS, and with appendices, including the Rastell fragments, chiefly concerning FISHER; the News letter to Paris, describing the trial and death of MORE; MORE's indictment; and MORE's epitaph. CCXXXI+400 p. Oxford, University Press, 1932. ISIS

Plattard, Jean. The life of FRANÇOIS RABELAIS. Translated by LOUIS P. ROCHE. XI+308 p. London, ROUTLEDGE, 1930. ISIS

Rabelais. Verzamelde werken. Volledige uitgave met de prenten van GUSTAVE DORÉ en A. ROBIDA, uit het Fransch vertaald door J. A. SANDIFORT. Uitg. A. G. SCHOONDERBEEK. 2 vols. Laren, 1931. ISIS

Reviewed by G. VAN RIJNBERK, *Bijdragen tot de geschiedenis der geneeskunde*, 12, 97-98, 1932.

Strowski, Fortunat. MONTAIGNE. Deuxième éd. rev. et cor. VIII+356 p. Paris, ALCAN, 1931. ISIS

XVIth Century (second half)

A. — *Mathematics*

Ginsburg, J. On the early history of the decimal point. *Scripta Mathematica*, 1, 84-85, 1932. ISIS

"The Italian mathematician GIOVANNI ANTONIO MAGINI made use of the comma as a decimal separatrix in a book published in the year 1592,—that is, a year before the work of CLAVIUS on the astrolabe was printed."

Ginsburg, J. HERCULES BUTRIGARIUS. *Scripta Mathematica*, 1, 92, 1932. ISIS

B. — *Physical sciences and technology*

Barnickel, J. B. CLAVIUS. Welt-Einheitskalender. Bamberger Beiträge zur Kalender-Reform. (CLAVIUS. Heft I : Feste Ostern). 128 p., portr., 10 tables. Bamberg, REINDL, 1932. (RM 4.25). ISIS

This issue contains the first two parts of the work : (1) CLAVIUS und sein Kalenderwerk, and (2) Festlegung des Osterfestes; the announced title of the last part is : (3) Gleichmass im Zeitmass. The first part is devoted to CHRISTOPHORUS CLAVIUS (1538-1612) and to his contributions to the Gregorian reform. Local patriotism affects somewhat the objectivity of the author's views; however, the copious quotations make it easy for the reader to draw conclusions from the available evidence; incidentally, it is possible that CLAVIUS was born in the diocese of Bamberg, not in the town itself. The second part offers an elaborate theologico-mathematical discussion of the problems presented by the Easter dates. The third part will offer a solution of these problems—" die neue Jahresteilung in gleiche Monate mit gleichen Daten." A. P.

Feuereisen, Arnold. Der älteste Rigasche Almanach und die ersten Kalendermacher in Riga. *Rigascher Almanach* pro 1929, 75-98. ISIS

Jenkins, Rhys. Civil engineering in 1595-7. The building and destruction of a pier at Hastings. *Transactions of the Newcomen Society*, 10, 100-01, 1929-30. ISIS

Panconcelli-Calzia, Giulio. GIROLAMO MERCURIALIS Beziehungen zur Phonetik und Phoniatrie. *Vox*, Mitt. a.d. Phonet. Laborat. d. Univ. Hamburg, 17, 13-19, 2 fig., 1931. ISIS

Reviewed by ZAUNICK, *Mitteilungen zur Geschichte der Medizin*, 31, 269, 1932.

Rössler, G. Ein unbekanntes Instrument von JOBST BÜRGI im Hessischen Landesmuseum zu Kassel. *Z. Instrumentenkde.*, 52, 31-38, 1932. ISIS

Reviewed by TROPFKE, *Mitteilungen zur Geschichte der Medizin*, 31, 269, 1932.

Vinci, Federico. OSTILIO RICCI da Fermo, maestro di GALILEO GALILEI. 39 p. Fermo, S. PROPERGI, 1929. ISIS

C. — *Natural sciences*

Bürger, H. Die Baumannshöhle. Geschichte eines Harzers Naturdenkmals. *Zeitschr. d. Harz-Ver. f. Gesch. u. Altertumskde.*, 63, 82-106, 1930. ISIS

Apropos of a letter (1591) by HEINRICH ECKSTORM, printed in *Historiae terrae motuum...*, Helmstadt, 1620.

Chidsey, Donald Barr. Sir HUMPHREY GILBERT, ELIZABETH's racketeer. VII+204 p., front., pl. London, HAMILTON, 1932. ISIS

Dutschmann, Georg. Zwei Gärtnerbestallungen aus dem 16. Jahrhundert. *Sächsisches Gärtnerblatt*, 11, 354-56, 1931. ISIS

Dutschmann, Georg. Ein Tagebuch aus der kurfürstlichen Hofgärtnerei zu Dresden vom Jahre 1572. *Sitzungsber. u. Abh. "Flora"*, Dresden, 34/35, 52-65, 1929/30. ISIS

Germez, D. Le cartographe GERARD MERCATOR, esquisse biographique. *La Revue Maritime*, Sept. 1931, p. 331-346. ISIS

P. 331 : " En 1869, le savant docteur belge J. VAN RAEMDONCK fit paraître en français, à Saint-Nicolas (Flandre Orientale), *Mercator, sa vie et ses œuvres*, ouvrage remarquable par son érudition, qu'on ne trouve plus que dans quelques bibliothèques. Enfin, en août 1914, M. H. AVERDUNK, en collaboration avec le Dr. J. MÜLLER-REINHARD, fit paraître en livraison spéciale (no. 182) des Mitteilungen de Petermann : *Gerhard Mercator und die Geographen unter seinen Nachkommen*. Dans cet ouvrage, l'auteur a utilisé outre les travaux de ses deux devanciers, ceux de l'Allemand BREUSING et surtout les nombreuses publications de l'érudit belge F. VAN ORTROY sur les œuvres de MERCATOR; le texte est écrit assez clairement et bien composé; il abonde en détails intéressants et on ne peut que lui reprocher certaines affirmations tendancieuses basées sur des preuves insuffisantes." R. C. A.

Hartley, Dorothy. THOMAS TUSSER 1557 floruit : his good points of husbandry. 195 p. London, Country Life, 1931. ISIS

Reviewed by E. G., *Nature*, 129, 348-49, 1932.

Koenig, Paul. JEAN NICOT als Entdecker des Tabaks (Zu seinem 400. Geburtstage.) *Münch. med. Wschr.*, 67, 1144-46, 1931. ISIS

Liszt, Eduard Ritter **von.** Die Zoologie des Kräuterbuches. Ein Kapitel unfreiwilligen Humors. *Med. Welt*, 5, 1157-58, 1230-31, 1931. ISIS

Rytz, W. Ein aus dem 16. Jahrhundert stammendes, neuentdecktes Herbar des Berner Botanischen Institutes. *Ber. Schweiz. Bot. Ges.*, 40, XIX-XXI, 1931. ISIS

Simler, Josias. *De Alpibus commentarius.* Die Alpen. Einleitung, Übersetzung und Erläuterungen von ALFRED STEINITZER. XXXIII+ 216 p., 112 fig. München, Gesellschaft Alpiner Bücherfreunde, 1931. ISIS

Reviewed by PAUL GEISSLER, *DLZ*, 3, 1085-86, 1932.

Tiberghien, Alb. A propos d'un portrait de CHARLES DE L'ESCLUSE, gravé par R. DE BAUDOUS. *Paginae Bibliographicae*, 2, 771-72, 1927. ISIS

Zaunick, Rudolph. Dr. JOHANNES FRANKE, ein Lausitzer Prähistoriker des 16. Jahrhunderts. *Sitzgsber. u. Abh. d. Naturw. Ges. Isis*, Dresden, 1929, 90-95, 1930. ISIS

D. — *Medical sciences*

Artelt, Walter. COSTANZO LANDI und seine "Methodus de bona valetudine tuenda". *Sudhoffs Archiv für Geschichte der Medizin*, 25, 315-29, 1932. ISIS

Barbillion, Dr. A propos d'un scandale littéraire et médical au XVI^e siècle. Le livre des erreurs populaires de LAURENT JOUBERT. *Bulletin de la Société française d'histoire de la médecine*, 26, 193-203, 1932. ISIS

Cardini, Massimiliano. GEROLAMO MERCURIALE (1530-1606). *Riforma Medica*, N. 37, 1930. ISIS

Reviewed by D. G., *Rivista di Storia delle Scienze Mediche e Naturali*, 14, 31, 1932.

Esser, A. Albert. Die ophthalmologische Therapie des BHĀVAPRAKĀŚA. (Der Ophthalmologie des BHĀVAPRAKĀŚA zweiter Teil). *Arch. Gesch. Med.*, 25, 184-213, 1932. ISIS

Reviewed by REINH. F. G. MÜLLER, *Mitteilungen zur Geschichte der Medizin*, 31, 227, 1932. See *Isis*, 15, 418.

Gros, H. Le malaise de la médecine à la fin du XVI^e siècle. *Paris méd.*, 21, 47, 285, 1931. ISIS

Apropos of ANDRE DU BREIL, « La police de l'art et science de médecine », Paris, 1580.

Händler, Eberhard. Das Boyneburger Rossarzneibüchlein. (*Abh. aus d. Gesch. d. Vet.-Med.* H. 16). *Vet.-Hist. Jb.*, 4, 41-67, 1928. ISIS

Lachs, J. Medical friends of JAN KOCHANOWSKI. 32 p. Cracow, 1930 (Polish). ISIS

Apropos of JACOB MONTANUS, S. FOGELWEDER, and GEORG KELLER.

E. — *Alia*

Chambers, Sir Edmund Kerchever. WILLIAM SHAKESPEARE. A study of facts and problems. In two volumes. Vol. 1., XVIII+576 p. Vol. 2, XVI+448 p. Oxford, Clarendon Press, 1930. ISIS

Faurey, Joseph. L'édit de Nantes et la question de la tolérance. 60 p., 1929. ISIS

Reviewed by A. ALBA, *Revue de l'histoire des religions*, 101, 91, 1930.

Harlow, Vincent Todd. RALEGH's last voyage, being an account drawn out of contemporary letters and relations, both Spanish and English, of which the most part are now for the first time made public, concerning the voyage of Sir WALTER RALEGH, knight, to Guiana in the year 1617, and the fatal consequences of the same. London, Argonaut Press, 1932. ISIS

Ralli, Augustus. A history of Shakespearian criticism. Two volumes. Oxford, University Press, 1932. ISIS

Shakespeare association facsimiles. No. 1. A dialogue concerning witches and witchcraftes, 1593, by GEORGE GIFFORD. With an introduction by BEATRICE WHITE. No. 2. Skialetheia, 1598, by EVERARD GUILPIN. No. 3. A health to the gentlemanly profession of servingmen, 1598, by I. M. With an introduction by A. V. JUDGES. No. 4. Vicissitudo rerum, 1600, by J. NORDEN. With an introduction by D. C. COLLINS. Oxford, University Press, 1932. ISIS

(Shakespeare). The SHAKESPEARE allusion book : a collection of allusions to SHAKESPEARE from 1591 to 1700. Re-edited, revised and re-arranged, with an introduction, by JOHN MUNRO (1909), and now re-issued, with a preface, by Sir EDMUND CHAMBERS. Two volumes. Oxford, University Press, 1932. ISIS

XVIIth Century (whole and first half)

A. — *Mathematics*

Lewittes, Mendell H. JOSEPH DE MEDIGO on prosthaphaeresis. *Scripta Mathematica*, 1, 56-59, 1932. ISIS

Petit, Henri. Images. DESCARTES et PASCAL. 288 p. Paris, RIEDER. ISIS

B. — *Physical sciences and technology*

Kepler, Johannes. JOHANNES KEPLER, der kaiserliche Mathematiker... Zur Erinnerung an seinen Todestag vor 300 Jahren, hrsg. von KARL STÖCKL. 355 p., 37 fig., 28 pl. (*Ber. Naturw. Ver. Regensburg*, 19, 1928/30). Regensburg, SCHIELE, 1930. ISIS

Reviewed by WIELEITNER, *Mitteilungen zur Geschichte der Medizin*, 31, 9-11, 1932.

Keppler, Gustav. Familiengeschichte KEPPLER. I. Bd. : Genealogie. Sonderdruck d. Bandes 75 d. *Dtsch. Geschlechterbuches*. 2. Bd. : Astronom KEPLER und seine Zeit mit Schilderung des Hexenprozesses gegen seine Mutter. Bearb. u. hrsg. v. GUST. KEPPLER. XXIV+ 1018 p. ; 855 p. Görlitz, STARKE, 1931 and 1930. ISIS

Reviewed by E. ZINNER, *DLZ*, 3, 1625, 1932.

Klemm, Friedrich. Die Dresdner Kepleriana. *Wiss. Beil. d. Dresdner Anz.* 7, 177-78, 1930. ISIS

Reviewed by ZAUNICK, *Mitteilungen zur Geschichte der Medizin*, 31, 11, 1932.

Mittmann, J. Zur Münztechnik im Anfang des 17. Jahrhunderts. *Beiträge z. Gesch. Techn. Ind.*, 21, 157-58, 2 fig., 1932. ISIS

Schmidt, Curt. Die Mystik in KEPLERS Weltanschauung. *Sitz.-Ber. Isis*, Dresden, 1930, 146-62, 2 fig., 1931. ISIS

Tiberghien, Albert. Cartes lunaires peu connues. II. CLAUDE MELLAN (1634-1635). *Ciel et Terre*, 48, 106-11, 122-32, 1932. ISIS

C. — *Natural sciences*

Commissariat, M. S. MANDELSLO's travels in Western India (A.D. 1638-9). XX+115 p., 6 pl. Oxford, University Press, 1931. ISIS

Reviewed by P. R. C., *Journal of the Royal Asiatic Society*, 631-33, 1932.

Horak, Bohuslav. DANIEL VETTER a jeho " Islandia." 214 p. Brno, Masaryk University, 1931. ISIS

Reviewed by J. H. REYNOLDS, *Geographical Journal*, 79, 509-10, 1932. " DANIEL STREJO (the Czech name of which VETTER is a German translation) journeyed through S. W. Iceland in 1613. His 'Short description of the island of Iceland' was published in Polish at Leszno (1638), in German at Weisskirchen (1640), and in Czech at Prague (1673). All three text are given here, with introduction and notes. Further reference to VETTER will be found in THORODDSEN, *Geschichte der Isländischen Geographie*, 2, 205-19, Leipzig, 1897." C. W. A.

D. — *Medical sciences*

Borromeo, Federico (1564-1631). De pestilentia. Codice inedito della Biblioteca Ambrosiana. Edizione critica e note a cura di AGOSTINO SABA. XVI+39 p., 1 facs. (*Collana Federiciana*, II). Sora, PASQUALE CARLO CAMASTRO, 1932. ISIS

Critical edition with introduction and notes of the " De pestilentia in urbe Mediolani anno 1630," one of the unpublished writings of the great Cardinal. The text is divided as follows : 1. De pestilentia quae Mediolani anno 1630 magnam stragem edidit; 2. De origine pestilentiae divinatione humana; 3.-4. De fraude, et operatione doemonum; 5. De artibus spargendae pestis origineque artium earum; 6. De monstris; 7. De statu et forma civitatis pestilentiae tempore; 8. De miserandis casibus; 9. De morientium confessionibus pioque dolore et sensu; 10. De ministris; 11. De novitate et vanitate remediorum; 12. Quaenam ex civili administratione remedia esse potuerint adversus pestilentiae damna tum in urbe tum extra urbem; 13. Qui rerum status esset cum ista scriberemus. G. S.

Herringham, Sir Wilmot. The life and times of Dr. WILLIAM HARVEY. *Annals of Medical History*, 4, 249-72, 347-63, 491-502, 1 fig., 1932. ISIS

Thyssen, Edward Hendrik Marie. NICOLAAS TULP. A contribution to the history of the medical science of the seventeenth century by EDWARD HENDRIK MARIE THYSSEN. Translated from the Holland Dutch by ADRIAN SCOLTEN. *Medical Life*, 39, 297-330, 2 illus., 1932. ISIS

XVIIth Century (second half)

A. — *Mathematics*

Mahnke, Dietrich. Zur Keimesgeschichte der Leibnizschen Differentialrechnung. *Sitzungsberichte der Gesellschaft zur Beförderung der gesamten Naturwissenschaften* zu Marburg, 67, 31-69, 6 facs., 1932. ISIS

The author continues his study of the LEIBNIZ manuscripts and his "embryological" investigation of LEIBNIZ' thought, whose deep originality he is thus able to establish. The author's method is fertile for the investigation of the past but I am not sure that it would be equally fertile for the exploration of the future as he seems to suggest on p. 33. It is true LEIBNIZ himself had remarked "Nichts is so wichtig, wie die Ursprünge der Erfindungen kennen zu lernen; sie sind meines Erachtens viel mehr wert als die Erfindungen selbst, wegen ihrer Fruchtbarkeit," and his MSS. are full of remarks on the subject. Says M.: "Die Sammlung der LEIBNIZ-Handschriften, die sich noch heute in der vormals Königlichen Bibliothek in Hannover befindet, deren Verwalter einst LEIBNIZ selber war, ist infolgedessen eine unerschöpfliche Fundgrube für die Ontogenie und Psychologie der wissenschaftlichen Entdeckungen, vor allem auf mathematischem, aber auch auf physikalischem, philosophischem und anderen Gebieten. In seinen letzten Lebensjahren hat LEIBNIZ ausserdem noch einen grösseren zusammenfassenden Bericht über den Ursprung seiner wichtigsten mathematischen Entdeckung geschrieben." The paper is an important contribution to the LEIBNIZ-NEWTON controversy. G. S.

B. — *Physical sciences and technology*

(Huygens, Christiaan). Œuvres complètes de CHRISTIAAN HUYGENS, publiées par la Société Hollandaise des Sciences. T. XVII. L'horloge à pendule de 1656 à 1666. Travaux divers de physique, de mécanique et de technique de 1650 à 1666. Traité des couronnes et des parhélies (1662 ou 1663). 552 p., ill., La Haye, NIJHOFF, 1932. ISIS

Ce dix-septième volume de l'édition que poursuit avec tant de soin la Société Hollandaise des Sciences de Harlem, est enrichi de la reproduction d'un dessin de l'église de Scheveningue qui nous révèle un HUYGENS d'une très grande habileté à manier le crayon.

C'est vers la fin de décembre 1656 que HUYGENS conçut l'idée d'adapter comme régulateur du mouvement aux horloges à roues dentées, dans l'intérêt de l'astronomie et de la navigation, le pendule dont GALILÉE avait découvert, sans doute avant 1629, les lois d'oscillation. En 1657 était construite l'horloge qui se trouve actuellement au "Nederlandsch historisch natuurwetenschappelijk Museum" à Leiden. En 1658 paraissait *Christiani Hugenii à Zulichem Const. F. Horologium.* Je cite maintenant les titres de chapitres qui donnent eux-mêmes l'histoire de l'horloge de HUYGENS jusqu'en 1666 : Projet de 1659 d'une horloge à pendule conique; L'horloge à pendule à arcs cycloïdaux de décembre 1659 et son réglage par le poids curseur de 1661; Projet de 1660 d'une édition amplifiée de l'*Horologium* de 1658, suivi de quelques morceaux datant des années 1659-1666 et correspondant à des sujets traités dans l'*Horologium oscillatorium* de 1673; Horloges marines (et sympathie des horlogers); Brève instruction au sujet de l'emploi des horloges pour trouver les longitudes orientales et occidentales (conçue dès 1662, mais publiée seulement en 1665). Ces travaux sur les horloges sont suivis de diverses notes de physique sur la percussion, la pesanteur, la taille des lentilles,

les machines pneumatiques, les anneaux de NEWTON, etc., et du traité *De coronis et parheliis*, rédigé, sous la forme où nous le possédons, en 1662 ou 1663, mais qui ne parut que dans les *Opuscula postuma* de 1703.

Malgré tout le soin apporté à cette édition, on y trouve quelques erreurs typographiques, dont une au moins a une certaine importance : CUREAU DE LA CHAMBRE y est deux fois (pp. 525 et 537) appelé Cuzeau de la Chambre; de même, la page de titre indique « l'horloge à pendule de 1651 à 1666 » au lieu de 1656 à 1666. L. G.

Jenkins, Rhys. "The art of water-drawing." *Transactions of the Newcomen Society*, 10, 28-35, 1929-30. ISIS

(Wren, Sir Christopher). The eighth volume of the Wren Society, 1931. Being thirty-two large drawings for Whitehall, Windsor and Greenwich, 1694-1698. Oxford, University Press, 1932. ISIS

(Wren, Sir Christopher). The parochial churches of Sir CHRISTOPHER WREN, 1666-1718. Part I., Reprint of JOHN CLAYTON's "Churches of Sir Christopher Wren, 1848," and original WREN drawings from the collections at All Souls College, British Museum, Sir JOHN SOANE's Museum, with contemporary engravings collected by SAMUEL PEPYS, now in the Pepysian Library at Cambridge. Part II., The description of the churches (1666-1718), and accounts to be given in Vol. X for 1933, with other supplementary plates. 99 p., 43 pl. (Ninth volume of the Wren Society, 1932). Oxford, University Press, 1932. ISIS

(Wren, Christopher). The WREN tercentenary. *Nature*, 130, 636, 1932. ISIS

C. — *Natural sciences*

Brim, Charles J. ANTON VAN LEEUWENHOECK. In commemoration of the 300th anniversary of his birth. *Medical Life*, 39, 425-39, figs., 1932. ISIS

Chapman, A. Chaston. The yeast cell : what did LEEUWENHOECK see? *Journal of the Institute of Brewing*, 37, 433-35, facs., 1931.

Apropos of LEEUWENHOECK's communication to the R. S. made in 1680, in the form of a Dutch letter to THOMAS GALE; first published in Dutch, Leyden, 1684, then in Latin translation in the *Arcana naturae detecta*, Delft 1695. LEEUWENHOECK did actually observe yeast cells. Facsimiles. G. S.

Fairbridge, Dorothea. Historic farms of South Africa : the wool,

the wheat, and the wine of the 17th and 18th centuries. XII+194 p. Oxford, University Press, 1931. ISIS

Reviewed by W. L. SCLATER, *Geographical Journal*, 79, 429-30, 1932. "JOHAN VAN RIEBECK, Commander at the Cape 1652-1662, introduced into South Africa all the European vegetables as well as vines and fruit trees. SIMON VAN DER STELS, Commander 1679-1699, introduced the oak." C. W. A.

Heawood, Edward. JOHN ADAMS and his map of England. *Geographical Journal*, 79, 37-44, 1932. ISIS

A full discussion, supplementing the notice in the *Dictionary of National Biography*, of the scanty facts; with a list of the sixteen known editions of the map, ranging from the original of c. 1680 to 1794. C. W. A.

Leeuwenhoek, Anthony Van (1632-1723). Tentoonstelling ANTHONY VAN LEEUWENHOEK. 42 p., frontispiece. Museum voor het onderwijs te 's Gravenhage, 12 Nov. 1932 tot Jan. 1933. ISIS

Catalogue of an exhibition arranged in the Hague to celebrate the tercentenary of LEEUWENHOEK's birth. Includes a short biography by A. SCHIERBEEK, a beautiful portrait in color, a bibliography and chronology. The catalogue itself by W. H. VAN SETERS contains many extracts from LEEUWENHOEK's letters and valuable descriptions. G. S.

Schierbeek, A. Het leven van ANTONY VAN LEEUWENHOEK. 8 p., 3 fig., port. Overdruk uit het LEEUWENHOEK nummer van *Natura*, orgaan der Nederlandsche Natuurhistorische Vereeniging, 15 October 1932. ISIS

Short biography with a list of his discoveries very well arranged in systematic and chronological order, and with a portrait extracted from the Anatomy lesson of C. VAN 'S GRAVESANDE painted by CORNELIS DE MAN in Delft, 1681. Very useful summary. G. S.

D. — *Medical sciences*

Dempster, James Herbert. JOHN LOCKE, physician and philosopher. *Annals of Medical History*, 4, 172-86, 1932. ISIS

Goulard, R. Lettres de maîtrise de CLAUDE TERRIER, maître-chirurgien à Brie-Comte-Robert (1674). Acte de cession de la maîtrise de feu CLAUDE-TERRIER (1679). *Bulletin de la Société française d'histoire de la médecine*, 26, 303-07, 1932. ISIS

Major, Ralph H. RAYMOND VIEUSSENS and his treatise on the heart. *Annals of Medical History*, 4, 147-54, frontispiece, 7 fig., 1932. ISIS

E. — *Alia*

Brett-Majes, N. G. PETTY and GRAUNT. *Times Literary Supplement*, p. 643, London, Sept. 15, 1932. ISIS

Greenwood, Major. GRAUNT and PETTY. *Times Literary Supplement*, p. 666, London, Sept. 22, 1932. ISIS

Lansdowne. PETTY and GRAUNT. *Times Literary Supplement*, p. 624, London, Sept. 8, 1932. ISIS

(Locke, John). A LOCKE exhibition. *Times Literary Supplement*, p. 336, London, May 5, 1932. ISIS

Matthews, W. LOCKE's shorthand diaries. *Times Literary Supplement*, p. 691, London, Sept. 29, 1932. ISIS

XVIIIth Century (whole and first half)

B. — *Physical sciences and technology*

Becker, Clarence O.; Titley, Arthur. The valve gear of NEWCOMEN's engine. *Transactions of the Newcomen Society*, 10, 1-14, 5 fig., 1929-30. ISIS

Browne, Charles Albert. An early experiment of JAMES WOODHOUSE upon the synthetic production of ammonia. *Jour. Chem. Ed.*, 9, 1744-47, 1932. T. L. D. ISIS

(Franklin, Benjamin). The ingenious Dr. FRANKLIN. Selected scientific letters of BENJAMIN FRANKLIN, edited by NATHAN G. GOODMAN. XII+244 p. Philadelphia, University of Pennsylvania Press, 1931. ISIS

Reviewed by ALLAN FERGUSON, *Nature*, 130, 451-53, 1932.

D. — *Medical sciences*

Collina, Giovanni. Dell'italianità di GIACOMO PILARINO primo trattatista della vajolizzazione (A proposito di " Un centenario che non fu celebrato "). *Rivista di Storia delle Scienze Mediche e Naturali*, 14, 109-13, 1932. ISIS

GIACOMO PILARINO, 1659-1718.

Koopman, J. JOHANN SEBASTIAN BACH. (Geneeskundig-muziekhis-

torische studies, VII). *Bijdragen tot de geschiedenis der geneeskunde*, 12, 101-04, 1932. ISIS

Pratt, Frederick H. SWEDENBORG on the Thebesian blood flow of the heart. *Annals of Medical History*, 4, 434-39, 1932. ISIS

Waring, Joseph Ioor. St. Philip's hospital in Charlestown in Carolina. Medical care of the poor in colonial times. *Annals of Medical History*, 4, 283-89, 1932. ISIS

XVIIIth Century (second half)

A. — *Mathematics*

(Laplace). Monument à LAPLACE. By L. S., *Isis*, 18, 333, 1932. ISIS

Smith, David Eugene. THOMAS JEFFERSON and mathematics. *Scripta Mathematica*, 1, 3-14, 87-90, 1932. ISIS

"From these facts it is apparent that JEFFERSON was not a mathematician but that he was a man who appreciated the beauties, the grandeur, the values, the classics, and the uses of mathematics and did much to give to the science a recognized standing as a university subject."

B. — *Physical sciences and technology*

Doublet, E. Le bicentenaire de JÉROME DE LALANDE. *Revue scientifique*, 70, 452-58, 1932. ISIS

Hepburn, Joseph Samuel. Notes on the early teaching of chemistry in the University of Pennsylvania, the Central High School of Philadelphia, and the Franklin Institute of Pennsylvania. *Jour. Chem. Ed.*, 9, 1577-91, 1932. ISIS

At the University of Pennsylvania, chemistry was taught to college students as early as 1756 by Provost WILLIAM SMITH, and to students of medicine by Dr. JOHN MORGAN upon the institution of the medical department in 1765. In the Central High School of Philadelphia, lectures on chemistry were delivered during its first academic year (1838-1839), selection of professors was by competitive examination, and the examination of students was conducted by outside examiners during the period 1839-1859. Lectures on chemistry were delivered before the Franklin Institute shortly after its incorporation in 1824, and chemistry was included in the curriculum of its High School organized in 1826. T. L. D.

(Lavoisier). ANTOINE LAURENT LAVOISIER. Extracts from his memoirs, translated by EUG. and N. TROPOVSKI. Edited, with a biography

of A. LAVOISIER, and with a preface by M. A. BLOKH. 2nd ed. 80 p., portr. Leningrad, Vestnik snanya, 1931 (in Russian).

ISIS

Meldrum, A. N. LAVOISIER's work on the nature of water and the supposed transmutation of water into earth (1768-1773). *Archeion*, 14, 246-47, 1932. ISIS

A l'origine des travaux de LAVOISIER sur l'eau se trouvent trois mémoires de DÉPARCIEUX lus à l'Académie royale des Sciences en 1766, au sujet de l'alimentation de Paris en eau. En 1767, LEROY soutient que la transmutation de l'eau en terre n'est pas certaine : à la distillation, la terre que contient l'eau passe avec la vapeur, et il reste un léger résidu. LAVOISIER cherche à vérifier la doctrine de LEROY par distillations répétées, détermination du poids des résidus et du poids spécifique du distillat; conséquences : dissolution du verre par l'eau, méthode d'obtention de l'eau pure, et non transmutation de l'eau en terre. Le mémoire de LAVOISIER fut paraphé à l'Académie royale des Sciences en mai 1769, lu en séance en novembre 1770, et publié en 1773; un résumé en avait été publié en 1771. L. G.

C. — *Natural sciences*

Lacroix, Alfred. Le centenaire de CUVIER. *Revue générale des sciences*, 43, 499-502, 1932. ISIS

D. — *Medical sciences*

Lewis, Fielding O. WASHINGTON's last illness. *Annals of Medical History*, 4, 245-48, 1932. ISIS

Lint, J. G. de. De ontdekking der vaccinatie. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 155-56, 1932. ISIS

Packard, Francis R. How London and Edinburgh influenced medicine in Philadelphia in the eighteenth century. *Annals of Medical History*, 4, 219-44, 2 fig., 1932. ISIS

The S. WEIR MITCHELL oration.

Packard, Francis. WASHINGTON and the medical affairs of the Revolution. *Annals of Medical History*, 4, 306-12, 1932. ISIS

E. — *Alia*

Dihle, Helene. BERNHARD CHRISTOPH FAUSTS Beziehungen zur Schweiz und seine Briefe an PAUL USTERI. *Sudhoffs Archiv für Geschichte der Medizin*, 25, 349-81, 1932. ISIS

Hochreutiner, B. P. G. GOETHE et la science. *Revue générale des sciences*, 43, 407-10, 1932. ISIS

XIXth **Century** (whole and first half)

A. — *Mathematics*

Simons, Lao Genevra. German-American algebra of 1837. *Scripta Mathematica*, 1, 29-36, 1932. ISIS

B. — *Physical sciences and technology*

(Bodmer, John George). Diary of JOHN GEORGE BODMER, 1816-17. Edited by H. W. DICKINSON. *Transactions of the Newcomen Society*, 10, 102-14, 1929-30. ISIS

(Carnot, Sadi). A la mémoire de SADI-CARNOT. By L. S., *Isis*, 18, 332, 1932. ISIS

Davis, Tenney L. The FARADAY celebrations, 1931. *Jour. Chem. Ed.*, 9, 1203-18, 1932. ISIS

Fraser-Harris, D. F. Sir JOHN LESLIE, 1766-1832. *Nature*, 130, 651-52, 1932. IISS

Jellinek, Stefan. MICHAEL THONET (1796-1871), der Begründer der Bugholzmöbelindustrie. *Beiträge z. Gesch. Techn. Ind.*, 21, 143-47, 5 fig., 1932. ISIS

Loree, L. F. Abandonment of the railroad on which the first locomotive in America was tried. *Transactions of the Newcomen Society*, 10, 120, 1929-30. ISIS

Loree, L. F. The first steam engine of America. *Transactions of the Newcomen Society*, 10, 15-27, pl., 1929-30. ISIS

Love, Katherine S.; Emmett, P. H. Repetition of experiments reported by JAMES WOODHOUSE in 1808 relative to the production of ammonia. *Jour. Chem. Ed.*, 9, 1748-50, 1932. ISIS

Maxson, Ralph N. The Niter Caves of Kentucky. *Jour. Chem. Ed.*, 9, 1847-64, 1932. ISIS

An account of the early niter and gunpowder industry in Kentucky, based largely upon a memoir written in 1806 by Dr. SAMUEL BROWN of the medical department of Transylvania University. T. L. D.

Park, Joseph H.; Glouberman, Esther. The importance of chemical

developments in the textile industries during the industrial revolution. *Jour. Chem. Ed.*, 9, 1143-70, 1932. ISIS

Picard, Emile. Une commémoration de SADI CARNOT au Petit-Luxembourg. *La Revue de France*, 12, 360-65, 1932. ISIS

Smith, Edgar C. Pioneer ships of the Atlantic Ferry. *Transactions of the Newcomen Society*, 10, 46-54, 1929-30. ISIS

Titley, Arthur. RICHARD TREVITHICK and the winding engine. *Transactions of the Newcomen Society*, 10, 55-68, 1929-30. ISIS

Wagemann, H. ANYOS JEDLIK (1800-95). *Beiträge z. Gesch. Techn. Ind.*, 21, 158-60, 4 fig., 1932. ISIS

C. — *Natural sciences*

Bouquet, Henri. Comment mourut CUVIER. *Revue générale des sciences*, 43, 344-45, 1932. ISIS

(Cuvier, Georges). Le centenaire de GEORGES CUVIER. By L. S., *Isis*, 18, 333, 1932. ISIS

Florian, J. The early history of the cell theory. *Nature*, 130, 634-35, 1932. ISIS

" It is now generally recognised that SCHWANN was not the first to discover cells in the body of an animal but he is often regarded as the founder of the theory of the conformity in the elementary structure of plants and animals. In a recent number of the *Anatomischer Anzeiger* Prof. F. K. STUDNICKA shows that SCHWANN was neither the first to make this suggestion, nor did he really prove it. He has studied the work of all the forerunners of SCHWANN and has attempted systematically to interpret the significance of their work."

Gibson, William. Some further traces of the FRANKLIN retreat. *Geographical Journal*, 79, 402-08, 1932. ISIS

Hobbs, William H. WILKES land rediscovered. *Geographical Review*, 22, 632-55, 5 fig., 1 map, 1932. ISIS

" In 1838, a United States Exploring Expedition commanded by Lieutenant, afterwards Admiral, CHARLES WILKES, U. S. N., departed on a four-year cruise destined to circumnavigate the globe and to become famous by reason of establishing the existence of an Antarctic Continent, one of the great discoveries in the history of geography." " The importance of WILKES's discovery was not so much in finding mainland near the Antarctic Circle, for this had been done by BISCOE in 1831 in another sector of the Antarctic, but in proving, by a series of landfalls distributed fairly regularly througho ut a stretch of 1500 miles and through 60 degrees of longitude near that circle,

that the land discovered had continental dimensions." With regard to BISCOE's discovery of 1831, see EDWARD W. DALTON in *Isis*, 16, 379-92, 1931. G. S.

Pilon, Edmond. Le salon de CUVIER au Jardin des Plantes. *Revue des deux mondes*, 102, 382-94, 1932. ISIS

Pincherle, Bruno. Uno scritto di GIUSEPPE MAZZINI sulla scoperta della circolazione del sangue. *Rivista di Storia delle Scienze Mediche e Naturali*, 22, 417-32, portr., 1931. ISIS

Poirier, Jean. GEORGES CUVIER, second fondateur de l'Université. *La Revue de Paris*, 39, 85-115, 1932. ISIS

D. — *Medical sciences*

Bick, Edgar M. A note on the medical works of OLIVER WENDELL HOLMES. *Annals of Medical History*, 4, 487-90, 1932. ISIS

Hoeven, J. van der. Zes brieven van Prof. F. Z. ERMERINS en vier brieven van Prof. G. J. LONCQ aan Prof. Dr. C. PRUYS VAN DER HOEVEN. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 45-58, 1932. ISIS

FRANS ZACHARIAS ERMERINS, 1808-1871; GOSEWIJN JAN LONCQ, 1810-1887; CORNELIS PRUYS VAN DER HOEVEN, 1792-1871.

Pinkhof, H. Een pokkenepidemie onder een Indianenstam in 1837. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 83-84, 1932. ISIS

Testi, Alberico (1848-1931). GAETANO EMILIANI, faentino, il primo ovariotomista in Europa. Faenza, Lega, 1931. ISIS

GAETANO EMILIANI, 1773-1842. Reviewed by GINO VERITA, *Rivista di Storia delle Scienze Mediche e Naturali*, 23, 31, 1932; by L. CASTALDI, *ibidem*, 22, 486, 1931. First ovariotomy in Europe, 1815; first ovariotomy in America 1809, by EPHRAIM MCDOWELL.

Waite, Frederick C. Dr. LYDIA FOLGER FOWLER. The second woman to receive the degree of doctor of medicine in the United States. *Annals of Medical History*, 4, 290-97, 1932. ISIS

E. — *Alia*

Battistini, Mario. Le relazioni di LUIGI DE POTTER con scienziati italiani. *Rivista di Storia delle Scienze Mediche e Naturali*, 22, 68-83, 2 portr., 1931. ISIS

LOUIS DE POTTER, 1786-1859.

XIXth Century (second half)

A. — *Mathematics*

Buhl, A. PAUL BARBARIN (1855-1931). *Bulletin des sciences mathématiques*, 56, 72-78, 1932. ISIS

Siegel, Carl Ludwig. Über RIEMANNS Nachlass zur analytischen Zahlentheorie. *Quellen und Studien z. Gesch. Math. Astr. Phys.*, Abt. B : Studien, Bd. 2, 45-80, 1932. ISIS

B. — *Physical sciences and technology*

Becker, Fritz. Die Entwicklung der Eisenbetonbauweise. *Beiträge z. Gesch. Techn. Ind.*, 21, 43-58, 7 fig., 1932. ISIS

(Hastings, C. S.). CHARLES SHELDON HASTINGS. By FRANK SCHLESINGER. *The Astrophysical Journal*, 76, 149-55, portr., 1932. ISIS

Biography of C. S. HASTINGS (1848-1932), with a bibliography (47 items). A. P.

Kiliani, Heinrich. My life and work. *Jour. Chem. Ed.*, 9, 1909-14, 1932. ISIS

Organic chemist, born October 30th, 1855. T. L. D.

Kraft, Fritz Gerhard. "Hohenzollern, Aktiengesellschaft für Lokomotivbau" in Düsseldorf. Ein geschichtlicher Rückblick zu ihrer Stillegung im Jahre 1929. *Beiträge z. Gesch. Techn. Ind.*, 21, 79-84, 14 fig., 1932. ISIS

Kurzel-Runtscheiner, Erich. JOSEPH JOHN RUSTON (1809-95) und JOHN JOSEPH RUSTON (1820-73). *Beiträge z. Gesch. Techn. Ind.*, 21, 97-102, 6 fig., 1932. ISIS

(Meidinger, Heinrich, 1831-1905). HEINRICH MEIDINGER. By WALTER BUCERIUS. *Beiträge z. Gesch. Techn. Ind.*, 21, 163-64, fig., portr., 1932. ISIS

Schulz, W. Entwicklung der elektrischen Heizung im 19. Jahrhundert. *Beitrage z. Gesch. Techn. Ind.*, 21, 12-24, 24 fig., 1932. ISIS

Stenger, Erich. Der Landschaftsphotograph und seine Arbeitsbehelfe zwischen 1860 und 1880. *Beiträge z. Gesch. Techn. Ind.*, 21, 131-32, 2 fig., 1932. ISIS

Weeks, Mary Elvira. The discovery of the elements. XIV. The periodic system of the elements. XV. Some elements predicted by MENDELEEFF. *Jour. Chem. Ed.*, 9, 1593-1604, 8 fig., 1605-19, 11 fig., 1932. ISIS

C. — *Natural sciences*

Bellot, A. La carte d'Algérie, 1830-1930. IV+162+104 p. Paris, Service Géographique de l'Armée, 1930. ISIS

Reviewed by H. S. L. WINTERBOTHAM, *Geographical Journal*, 79, 233-34, 1932.

Marchi, Carlo. Un medico straniero ospite di Firenze, studioso della paleontologia italica. CHARLES IMMANUEL FORSYTH MAJOR, illustratore della Tirrenite. *Riv. stor. sci. med. e natur.*, 22, 170-75, 1931. ISIS

CH. I. F. MAJOR, 1843-1923.

Pincherle, Bruno. La vita e l'opera di ALFONSO CORTI. Recherches sur l'organe de l'ouie des mammifères par le Marquis ALPHONSE CORTI. Proemio del Prof. GUGLIELMO BILANCIONI. 132 p., 17 figs., 2 pl. Collana del " Valsalva," n. 12. Rome, POZZI, 1932. ISIS

Biography of the great Italian anatomist ALFONSO CORTI, whose name is immortalized by the " organ of Corti," which he discovered. The memoir in which this discovery was published appeared in the *Zeitschrift für wissenschaftliche Zoologie* in 1851 (vol. 3, 109-69), and it is reprinted in the present volume. The author has added a bio- and bibliographical introduction well illustrated. CORTI was born in 1822 (a famous year ! think of MENDEL, GALTON, PASTEUR) in Gambarana near Pavia (not in Sardinia as is said in the " revised " edition of HIRSCH's *Biographisches Lexicon*, q.v. *Isis*, 14, 565; 15, 314); he died near Casteggio near Pavia in 1876. It is interesting to note that his birthyear was the deathyear of his great forerunner DOMENICO COTUGNO (1736-1822) who immortalized himself also with otological investigations, witness the aquaeductus Cotunii of the human ear. Both COTUGNO and CORTI made their fundamental discoveries about their 25th year.

G. S.

Sörensen, Jon. The saga of FRIDTJOF NANSEN. Transl. from the Norwegian by J. B. C. WATKINS. VI+372 p., portr., 7 pls., 6 figs. New York, NORTON, 1932 ($ 4.50). ISIS

SÖRENSEN's life of NANSEN touches lightly on his research in zoology, deals more extensively with his explorations in Greenland and the Polar Sea, his exploits as sportsman with the Arctic fauna, and his oceanographical researches. In this last named field NANSEN was a pioneer in modern methods of physical oceanography and was the inventor of the reversing water bottle. His influence was potent in the formation of the International Commission for the Investigation of the Sea and he was the first director of the Central

Laboratory at Oslo for the improvement of methods and apparatus for oceanographic research. His work on " The Norwegian Sea " (1909) contained the first charting of ocean currents within a definite region by modern methods. This was followed by a series of oceanographic papers on AMUNDSEN's observations on the Spitzbergen Expedition, on the investigations of the " Fram " in the North and South Atlantic, and the North-Eastern Atlantic. His polar studies led him ultimately to the problems of earth masses and resulted in his " Strandflat and Isostasy " (1922) and " The Earth's Crust " (1928). His " Northern Mists " (1911) dealt with the exploration of the Arctic regions from the earliest times to about 1500 A.D. In his efforts to disentangle myth and legend from fact he concluded that the story of the Vinland voyages and the saga of LEIF ERICSON are so embroidered that little that is trustworthy remains. NANSEN's works are illustrated with his own drawings, saga-like in simplicity, but monumental in line and mood.

The book contains a chronological table of the events of NANSEN's varied public and scientific career, a bibliography of 117 books and articles, a list of 13 English translations, and a NANSEN bibliography of 33 items.

C. A. K.

D. — *Medical sciences*

Bazy, Pierre. Sur un point de l'histoire de la lithotritie. ***Bulletin de la Société française d'histoire de la médecine***, 26, 296-97, 1932. ISIS

Apropos d'un mémoire du Dr. COURTY de Montpellier, 1863. G. S.

Garrison, Fielding H. Bibliographie der Arbeiten MORITZ STEINSCHNEIDERS zur Geschichte der Medizin und der Naturwissenschaften. *Sudhoffs Arch. Gesch. Med.*, 25, 249-78, 1 portr., 1932. ISIS

Zeiss, Heinz. ELIAS METSCHNIKOW, Leben und Werk. Übersetzt und bearbeitet nach der von OLGA METSCHNIKOWA geschriebenen Biographie, dem Quellenmaterial des Moskauer Metschnikow-Museums und eigenen Nachforschungen. 196 p., 5 pl. Jena, FISCHER, 1932. ISIS

Reviewed by DIEPGEN, *Mitteilungen z. Gesch. d. Medizin*, 31, 299-301, 1932.

E. — *Alia*

Bréhier, Emile. Histoire de la philosophie. T. II. La philosophie moderne, fasc. 4. Le XIX^e^ siècle après 1850 ; le XX^e^ siècle. Index général. 278 p., Paris, ALCAN, 1932. ISIS

Ce septième fascicule de l'*Histoire de la philosophie* d'EMILE BRÉHIER, maintenant menée à bonne fin avec ses 1184 p., étudie l'histoire de la philosophie européenne de 1850 à 1930 en la coupant en deux périodes. La première, qui conduit jusqu'aux environs de 1890 est surtout dominée par la logique de MILL, le transformisme de DARWIN, l'évolutionnisme de SPENCER; à cette période de « défenses, négations, réductions qui annihilent l'être et

les valeurs intellectuelles ou morales », succède à la fin du XIX^e siècle et au début du XX^e, un renouveau du spiritualisme, de l'idéalisme, les travaux de critique des sciences, de critique philosophique, etc., auxquels il serait difficile de trouver une commune orientation. L'ouvrage de BRÉHIER, parfaitement équilibré, très complet en ce qui concerne l'histoire de la philosophie occidentale, sera complèté, pour les doctrines philosophiques de l'Orient et de l'Extrême Orient, par un fascicule supplémentaire rédigé par P. MASSON-OURSEL. (Pour les fasc. antérieurs, voir *Isis*, 9, 593; 11, 555; 14, 563; 15, 425; 19, 310). G. L.

XXth Century

A. — *Mathematics*

Struik, D. J. C. L. E. MOORE. *Journal of Mathematics and Physics*, 11, 11 p., 1932. ISIS

CLARENCE LEMUEL ELISCHA MOORE, 1876-1931. Biography with a portrait and a list of MOORE's publications.

Talmey, Max. Personal recollections of EINSTEIN's boyhood and youth. *Scripta Mathematica*, 1, 68-71, 1932. ISIS

B. — *Physical sciences and technology*

Davis, Tenney L. LYMAN CHURCHILL NEWELL (American contemporary series). *Ind. Eng. Chem.*, 24, 1082-83, 1932. ISIS

Biographical sketch with portrait of a Foundation member of the History of Science Society who is professor of chemistry at Boston University. T. L. D.

(Morpurgo, Giulio). In morte del Prof. GIULIO MORPURGO (1865-1931). By GINO TESTI in *Rivista di Storia delle Scienze Mediche e Naturali*, 23, 28-29, 1932. ISIS

C. — *Natural sciences*

Drygalski, Erich von. Deutsche Südpolar-Expedition, 1901-1903. 22 vols., 2 atlases. Berlin, DE GRUYTER, 1905-31. ISIS

Reviewed by H. R. MILL, *Geographical Journal*, 79, 506-08, 1932. "Sixteen specialists shared in the production of the first seven volumes of physical researches, and eighty-seven in the last thirteen on biology." C. W. A.

Mill, H. R.; Zetland, the Marquess of. Speeches at the unveiling of the SHACKLETON Memorial. *Geographical Journal*, 79, 161-67, 1932.

Roule, Louis. L'Œuvre zoologique du professeur RENÉ KOEHLER (1860-1931). *Revue générale des sciences*, 43, 402-06, 1932. ISIS

Williams, J. H. Historical outline and analysis of the work of the Survey Department of Kenya Colony, 1 April 1903 to 30 September 1929. VI+118 p. Nairobi, Government Printer, 1931. ISIS

Reviewed by E. M. JACK, *Geographical Journal*, 79, 513-14, 1932.

Yamasaki, Naomasa. Collected essays. Vol. 1, VIII+564 p. Vol. 2, VI+630+42 p. Tokyo, Kokon Library, 1927-28. ISIS

Reviewed by W. WESTON, *Geographical Journal*, 79, 438-39, 1932. "Articles on valcanoes, geology, geomorphology, glaciology, seismology (on which subject YAMASAKI was one of the greatest living authorities), archaeology, anthropology and geography." C. W. A.

E. — *Alia*

(British Association.) The advancement of science, 1932 : addresses delivered at the annual meeting of the British Association for the Advancement of Science (102nd year), York, August 31 — September 7, 1932. II+256 p. London, British Association, 1932. ISIS

PART II

HISTORICAL CLASSIFICATION

I. — ANTIQUITY

1. — ANTIQUITY (*generalities*)

Audebeau Bey, Charles. Les irrigations dans le monde antique. Causes de leur décadence. *Revue générale des sciences*, 43, 272-82, 1932. ISIS

Egypte; Mésopotamie; Palestine.

Horwitz, Hugo Th. Neue Forschungen zur Technik des Altertums. *Beiträge z. Gesch. Techn. Ind.*, 21, 163, 1932. ISIS

2. — EGYPT

Lint, J. G. de. Beitrag zur Kenntnis der anatomischen Namen im alten Ägypten. *Sudhoffs Archiv für Geschichte der Medizin*, 25, 382-90, 1932. ISIS

Loria, Gino. Les mathématiques chez les anciens égyptiens, revue générale. *Bulletin des sciences mathématiques*, 56, 236-47, 1932. ISIS

Mehmke, R. L. Beitrag zur Geschichte der technischen Wissenschaften im alten Aegypten. *Beiträge z. Gesch. Techn. Ind.*, 21, 115-22, 6 fig., 1932. ISIS

3. — BABYLONIA AND ASSYRIA

Bork, Ferdinand. Das Zahlensystem nach der Fünf im Mitani. *OLZ*, 35, 89-91, 1932. ISIS

Fotheringham, J. K. The indebtedness of Greek to Chaldaean astronomy. *Quellen und Studien z. Gesch. d. Math., Astr., Phys.*, Abt. B: Studien, Bd. 2, 28-44, 1932. ISIS

Reprinted from *The Observatory*, 51, no. 653, 1928, with additional notes on Babylonian and Greek circle graduations by O. NEUGEBAUER. G. S.

Langdon, S. A new factor in the problem of Sumerian origins. *Journal of the Royal Asiatic Society*, 593-96, 2 fig., 1931. ISIS

Apropos of a very ancient seal (c. 2800 B.C.?) found at Kish and bearing Indian numerals! Says the author (p. 596): "All this new material calls for explanation, and there is none, none at present. Early Mesopotamian racial and cultural origins are at present in a hopelessly obscure tangle. There is also the mathematical factor in the problem. The pictographic script has a trace of the pure decimal system in its mixture of the decimal and sexagesimal system. Apparently the Indian script has a decimal system, but this is uncertain. The Sumerian system is by origin undoubtedly sexagesimal." See also same journal, 47-48, 1932. G. S.

Neugebauer, O. Studien zur Geschichte der antiken Algebra. I. *Quellen und Studien z. Gesch. Math., Astron., Physik*, Abt. B: Studien, Bd. 2, 1-27, 1932. ISIS

"Die erste Frage bezieht sich auf die Beziehung zwischen Mathematik und Astronomie. Mir scheint, dass aus einem Text wie AO 8862 mit aller nur wünschenswerten Eindeutigkeit hervorgeht, dass die dort benötigte und behandelte Art von Mathematik nicht die Spur eines astronomischen Einschlages zeigt oder nötig macht." "Der zweite Fragenkreis schlingt sich um das Problem der 'babylonischen' Kultur als solcher."

4. — GREECE

Baumann, E. D. Der Wahnsinn der Io. *Sudhoffs Archiv für Geschichte der Medizin*, 25, 307-14, 1932. ISIS

Bidez, J. La cité du monde et la cité du soleil chez les Stoïciens. *Bulletin de l'Académie royale de Belgique*, 18, 244-94, 1932. ISIS

« Ceux qui persistent encore à méconnaître les origines orientales du Stoïcisme se laissent tromper par une histoire de la philosophie qui est restée trop hégélienne et qui nous donne du système enseigné dans le Portique une idée trop abstraite. » (p. 293). Ils négligent « le fatalisme inexorable qui, identifiant la loi du monde avec le Destin des astrologues, mit une fiction d'origine chaldéenne à la base du système. Pour rendre, à cet égard, à l'enseignement du Portique ses nuances et sa complexité, c'est la Cosmopolis antique qu'il faut reconstituer avec sa hiérarchie de dieux sidéraux et la pratique de l'astrologie et de l'héliolâtrie qui s'y rattache... » « Après ZÉNON et ses successeurs, chez POSIDONIUS, puis chez NUMÉNIUS et PLOTIN, comme chez PORPHYRE, chez JAMBLIQUE et chez PROCLUS, on trouve des doctrines dont on ne peut comprendre l'influence tant qu'on les détache des cultes et des mystères de l'Égypte ou de la Syrie, dont ces penseurs subissaient l'ascendant même quand ils les reniaient."

Davies, O. Two North Greek mining towns. *Journal of Hellenic Studies*, 49, 89-99, 1 fig., 1929. ISIS

" The present paper is an attempt to throw further light on the metal-sources of Greece in the bronze age, and describes some early mines which I have found there."

Smith, David Eugene. Note on a Greek papyrus in Vienna. *American Mathematical Monthly*, 39, 425, 1932. ISIS

Apropos of Papyrus Graecus Vindobonensis 19996.

Taylor, F. Sherwood. A survey of Greek alchemy. *Journal of Hellenic Studies*, 50, 109-39, 1930. ISIS

Elaborate and important survey divided as follows : 1. Introduction; 2. The papyri; 3. The manuscripts; 4. The texts; 5. Substances used by alchemists; 6. Imitation of silver; 7. Imitation of gold; 8. Alchemical apparatus and its use; Bibliography.

Says the author : " The earliest alchemical works that have survived are all written in Greek, and the extant Greek alchemical writings run to more than eighty thousand words." The first part of that statement needs correction if one takes into account the cuneiform texts of the seventh century B.C. investigated by R. CAMPBELL THOMPSON : On the chemistry of the ancient Assyrians (London, 1925; *Isis*, 9, 147). G. S.

II. — MIDDLE AGES

6. — MIDDLE AGES (*generalities*)

Celli-Fraentzel, Anna. Contemporary reports on the mediaeval Roman climate. *Speculum*, 7, 96-106, 1932. ISIS

Darmstaedter, Ernst. Die Sator-Arepo-Formel und ihre Erklärung. *Isis*, 18, 322-29, 1932. ISIS

New and ingenious interpretation of this magical formula which can be traced back to the early Middle Ages. G. S.

Erhardt-Siebold, Erika von. An archaeological find in a Latin riddle of the Anglo-Saxons. *Speculum*, 7, 252-56, 1 fig., 1932. ISIS

Apropos of cocuma duplex, a kind of *αὐθέψης* or samovar (" self-boiler "). A. P.

Kamal, Youssouf. Monumenta cartographica Africae et Aegypti. Tome 3, fascicule 1, folios 481-582. Notice to same. 12 p. Cairo, 1930-31. ISIS

Reviewed by H. A. R. GIBB and G. R. CRONE, *Geographical Journal*, 79, 143-44, 1932. " Period 650-950 A.D. Excerpts from the Arab geographers and chroniclers, illustrated by cartographic reconstructions, the only original being the Nile-map of KHWARIZMI from a MS. of date 1037 : reproductions of mediaeval world-maps, based almost entirely upon theological conceptions. The latter very comprehensive series, selected by Dr. F. C. WIEDER, includes a plate reproducing folios from a ninth-century MS. of the " Agrimensores Veteres Romanorum," embodying work of land surveyors of the fifth century; these maps are in a style similar to the earliest PTOLEMY MSS., and therefore support SCHÜTTE's contention that the latter are lineal descendants of maps drawn by PTOLEMY himself, or by his contemporaries." For vol. 1, 1926, see *Isis*, 12, 393. C. W. A.

Laignel-Lavastine ; Le Tessier, R. La lèpre dans l'Ain au moyen âge. *Bulletin de la Société française d'histoire de la médecine*, 26, 177-92, 1932. ISIS

" Conclusions : 1. La lèpre existait dans l'Ain avant les Croisades. 2. Il y eut une première recrudescence après les Croisades et une seconde aux XIV^e^ et XV^e^ siècles. 3. Avant les Chartes communales (1250-1300), c'est l'Église qui s'occupait des léproseries. 4. Après, ce fut ordinairement les Communes. 5. La lèpre resta une maladie assez rare, mais bien connue. 6. L'expertise médico-légale, en vue de l'isolement des lépreux, avait un double caractère scientifique et administratif. 7. La thérapeutique était nulle, mais la prophylaxie et l'hygiène préventive relativement assez développées."

Post, Gaines. Masters' salaries and student-fees in the mediaeval universities. *Speculum*, 7, 181-98, 1932. ISIS

7. — BYZANTIUM

Delatte, Armand. Un manuel byzantin de cosmologie et de géographie. *Académie royale de Belgique, Bulletin de la classe des lettres*, 18, 189-222, 1932. ISIS

Zenghelis, C. Le feu grégeois et les armes à feu des Byzantins. *Byzantion*, 7, 265-86, 1932. ISIS

III. — ORIENTAL SCIENCE AND CIVILIZATION

8. — ASIA (*generalities*)

Dennery, Etienne. Foules d'Asie : surpopulation japonaise, expansion chinoise, émigration indienne. 247 p., maps. Paris, COLIN, 1930. ISIS

Reviewed by JOHN E. ORCHARD, *Geographical Review*, 168-69, 1931.

Ross, Sir Edward Denison. Aldred lectures on nomadic movements in Asia : delivered before the Royal Society of Arts, April and May, 1929. 45 p., map. London, Royal Society of Arts, 1930. ISIS

Strzygowski, Josef. Asiens bildende Kunst in Stichproben, ihr Wesen und ihre Entwicklung. Ein Versuch. XXI+779 p. Augsburg, FILSER, 1930. ISIS

Reviewed by ZOLTÁN V. TAKÁCS, *OLZ*, 35, 1-7, 1932.

Western Asia

Bushnell, George Herbert. The world's earliest libraries. 58 p. London, GRAFTON, 1931. ISIS

Reviewed by F. KLEMM, *Mitteilungen zur Geschichte der Medizin*, 31, 12, 1932.

Butler, Howard Crosby. Early churches in Syria. Fourth to seventh centuries. Edited and completed by E. BALDWIN SMITH. XX+ 275 p. Princeton University, 1929. ISIS

Delaporte, Louis. Manuel de langue hittite. II. Eléments de grammaire hittite. Paris, MAISONNEUVE, 1929. ISIS

Reviewed by G. CONTENAU, *Journal des Savants*, 461-63, 1929.

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Reviewed by ALBRECHT GÖTZE, *OLZ*, 35, 466-68, 1932.

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We are glad to announce the completion of this fundamental publication to which count PULLÉ has devoted more than thirty years of his life. It contains not only the results of his own investigations but also appendices by MARIO LONGHENA and ALBERTO TRAUZZI. There are many maps and other illustrations. We only miss a general index which may still be published separately. G. S.

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Rösel, Richard. Die psychologischen Grundlagen der Yogapraxis. VII+135 p. (*Beiträge zur Philosophie und Psychologie*, H. 2.) Stuttgart, KOHLHAMMER, 1928. ISIS

Sarasin, Alfred. Der Handel zwischen Indien und Rom zur Zeit der römischen Kaiser. 36 p. Basel, HELBING & LICHTENHAHN, 1930. ISIS

Reviewed by H. SCHAEFER, *OLZ*, 35, 388-90, 1932.

Śāstri, Palamadai Pichumoni Sabrahmanyam. The Mahābhārata (southern recension). Critically edited. Vol. 1 : Ādi Parva, part 1. Madras, V. RAMASWAMY SASTRULU, 1932. ISIS

Reviewed by R. P. DEWHURST, *Journal of the Royal Asiatic Society*, 446-47, 1932.

Schrader, Friedrich Otto. Der Hinduismus. VII+87 p. (*Religionsgesch. Lesebuch*, hrsg. von A. BERTHOLET, 2., erw. Aufl., 14.) Tübingen, MOHR, 1930. ISIS

Reviewed by J. WITTE, *OLZ*, 275, 1932.

Scott, George Batley. Religion and short history of the Sikhs, 1469 to 1930. 100 p. London, Mitre Press, 1930. ISIS

Sengupta, P. C. Hindu luni-solar astronomy. *Bulletin of the Calcutta Mathematical Society*, 24, 1-18, 1932. ISIS

Last sentences : " Perhaps it has been established that so far as the luni-solar astronomy is concerned Hindu astronomy is independent of Greek astronomy in respect of astronomical constants, that Hindu astronomy is generally more accurate than Greek astronomy and that Hindu astronomers were not mere " calculators." There (sic) were observers who verified and corrected the old astronomical constants as they came down from ARGABHATA and BRAHMAGUPTA, who also found independently all the principal equations of the moon." R. C. A.

Sengupta, P. C. History of the infinitesimal calculus in ancient and mediaeval India. *Jber. Deutsch. Math.-Ver.*, 40, 223-27, 1931. ISIS

Shah, Chimanlal J. Jainism in North India, 800 B.C.-A.D. 526. Foreword by H. HERAS, S. J. XXIV+292 p., pl. (*Studies in Indian history of the Indian History Research Institute*, St. Xavier's College, Bombay, No. 6). London, LONGMANS, 1932. ISIS

Sukthankar, Vishnu S. The Mahābhārata for the first time critically edited. With the cooperation of many scholars. Fasc. 4. IV+

172 p. Fasc. 5, p. 401-640. Poona, Bhandarkar Oriental Research Institute, 1930-31. ISIS

Reviewed by JARL CHARPENTIER, *OLZ*, 35, 275-79, 1932; by R. P. DEWHURST, *Journal of the Royal Asiatic Society*, 668, 1932.

Suzuki, Daisetz Teitaro. Studies in the Lankāvatāra Sūtra. XXXII+464 p., 1 pl., 1 table. London, ROUTLEDGE, 1930. ISIS

Reviewed by W. E. SOOTHILL, *Journal of the Royal Asiatic Society*, 669-72, 1932.

Suzuki, Daisetz Teitaro. The Lankāvatāra Sūtra. A text of Mahāyāna Buddhism. Translated from the original Sanskrit with an introduction. XLIX+300 p. London, KEGAN PAUL, 1932. ISIS

Winternitz, M. Der Mahāyāna-Buddhismus nach Sanskrit- und Präkrittexten. VI+88 p. (*Religionsgesch. Lesebuch*, in Verb. mit Fachgelehrten hrsg. v. A. BERTHOLET. 2., erw. Aufl., 15). Tübingen, MOHR, 1930. ISIS

Reviewed by HEINRICH ZIMMER, *OLZ*, 35, 605, 1932.

Woolner, Alfred Cooper. Introduction to Prakrit. Second edition. 17+230 p. (Panjab University Oriental Publications). Lahore, Baptist Mission Press, 1928. ISIS

Reviewed by L. D. BARNETT, *Journal of the Royal Asiatic Society*, 450, 1930.

Zimmer, Heinrich. Anbetung mir. Indische Offenbarungsworte. Aus dem Sanskrit ins Deutsche gebracht von HEINRICH ZIMMER. 56 p. (*Der indische Geist*. Texte z. Wesen d. ind. Welt. Hrsg. v. H. ZIMMER.) München, OLDENBOURG, 1932. ISIS

Reviewed by OTTO STRAUSS, *DLZ*, 1, 296-97, 1930.

10. — CHINA

Czakó, Emmerich. Über einen chinesischen Vorläufer des Bunsenbrenners. *Z. angew. Chem.*, 44, 262, 1 fig., 1931. ISIS

Dickmann, H. Primitive Verkokungs- und Eisendarstellungsverfahren in China. *Beiträge z. Gesch. Techn. Ind.*, 21, 152-54, 3 fig., 1932. ISIS

Franke, O. Staatssozialistische Versuche im alten und mittelalterlichen China. 27 p. (*Sitzungsberichte der Preussischen Akademie der Wissenschaften*, 1931, 13). Berlin, DE GRUYTER, 1931. ISIS

Reviewed by A. FORKE, *OLZ*, 35, 614, 1932.

Granet, Marcel. Festivals and songs of ancient China. Translated from the French by E. D. EDWARDS. IX+281 p. (*Broadway Oriental Library*). London, ROUTLEDGE, 1932. ISIS

Hudson, C. F. Europe and China : a survey of their relations from the earliest times to 1800. VIII+336 p. London, ARNOLD, 1931. ISIS

Reviewed by G. R. CRONE, *Geographical Journal*, 79, 532-33, 1932. " Describes in detail the period in which, on the whole, China exerted greater influence upon Europe than she received. Demonstrates the extent of Chinese influence on European art in the eighteenth century, especially in France, an influence which, though not enduring, spread a knowledge of China which enabled her social and political ideas, introduced by the Jesuit missionaries and adopted by the Physiocrats, to gain a footing. VOLTAIRE and the ' enlightened despots ' are shown to have owed much to Chinese thought." C. W. A.

Li, H. Die Geschichte des Wasserbaues in China. *Beiträge z. Gesch. Techn. Ind.*, 21, 59-73, 18 fig., 1932. ISIS

Lübke, Anton. Der Himmel der Chinesen. 141 p., 39 pl. Leipzig, VOIGTLÄNDER, 1931. ISIS

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Mears, I.; Mears, L. E. Creative energy. Being an introduction to the study of the Yih King, or Book of changes, with translations from the original text. XXIV+239 p., 7 illus. London, MURRAY, 1931. ISIS

Very unfavorable review by R. F. JOHNSTON, *Journal of the Royal Asiatic Society*, 723-26, 1932.

Menzies, James M. The culture of the Shang dynasty. *Annual Report of the Smithsonian Institution* for 1931, p. 549-58, Washington, 1932. ISIS

Lecture delivered before the North China Union Language School, Peiping, China, on Feb. 6, 1931.

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Vorwahl, H. Die Geomantik. Aus den Kindertagen der Wissenschaft. *Allg. Vermess.-Nachr.*, 44, 166-69, 1932. ISIS

11. — JAPAN

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Reviewed by M. RAMMING, *DLZ*, 3, 1767-69, 1932.

Nachod, Oskar. Bibliographie von Japan 1927-1929, mit Ergänzungen für die Jahre 1906-1929, Bd. III des Gesamtwerkes, Nr. 9596-13595. XIII+410 p. Leipzig, HIERSEMANN, 1931. ISIS

Reviewed by F. E. A. KRAUSE, *OLZ*, 35, 66, 1932.

Uyemura, Rokuro. Studies on the ancient pigments of Japan. *Eastern art*, 3, 47-60, 1931. ISIS

Chemical and philological studies.

12. — ISRAEL

Abrahams, Israel. Jewish life in the Middle Ages. New edition, enlarged and revised on the basis of the author's material by CECIL ROTH. XXI+478 p. London, GOLDSTON, 1932. ISIS

Albright, William Foxwell. The archaeology of Palestine and the Bible. 233 p. (The Richards lectures delivered at the University of Virginia.) New York, REVELL, 1932. ISIS

Bentwich, Norman. Of Jews and Hebraism in the Greek anthology. *Jewish Quarterly Review*, 23, 181-86, 1932. ISIS

"The figures and allegories in mosaic passed on to the early painting of the Byzantines, and so to the Hebraism of the early Italian and Flemish art: which, in turn, gave place to the Hellenism of the Renaissance. As the Greek anthology began with the utterances of pagan morals and ethics, and ended one thousand years later with the utterances of Hebrew ethics and the homilies of the Jewish-Alexandrian school, so, in the reverse direction, modern plastic art began with the Hebraic ideas and types, and was then converted to the portrayal of pagan modes and manners and to the free humanism of the Hellenic spirit."

Bloch, Chajim. Priester der Liebe. Die Welt der Chassidim. Mit zahlreichen Brief-Faksimiles. 266 p. Zürich, Amalthea-Verlag, 1930. ISIS

Reviewed by L. GULKOWITSCH, *OLZ*, 35, 478, 1932.

Dubnow, Simon. Geschichte des Chassidismus. 2 vols. Vol. 1.

Aus dem Hebräischen übers. von A. STEINBERG. 340 p. Berlin, Jüdischer Verlag, 1931. ISIS

Reviewed by G. SCHOLEM, *OLZ*, 35, 569-71, 1932.

Efros, Israel. KLATZKIN's " Oẓar ha-munaḥim ha-pilosofiim." *Jewish Quarterly Review*, 22, 191-98, 1931. ISIS

Feldman, W. M. Rabbinical mathematics and astronomy. XVIII+232 p. London, CAILINGOLD, 1931. ISIS

Reviewed by S. B., *Nature*, 130, 328-29, 1932.

Fiebig, Paul. Der Talmud, seine Entstehung, sein Wesen, sein Inhalt unter besonderer Berücksichtigung seiner Bedeutung für die neutestamentliche Wissenschaft dargestellt. VI+140 p. Leipzig, PFEIFFER, 1929. ISIS

Reviewed by M. DIBELIUS, *OLZ*, 34, 724-27, 1931.

Gandz, Solomon. The origin of the gnomon or the gnomon in Hebrew literature. *Proc. Amer. Acad. for Jewish Research*, 23-38, 1930-31. ISIS

Godbey, A. H. The lost tribes a myth—suggestions towards rewriting Hebrew history. XX+802 p., 3 maps, 44 pl. (Duke University Publications). Durham, N.C., Duke University Press, 1930. ISIS

Reviewed by GEORG BEER, *OLZ*, 35, 408-09, 1932.

Golovensky, David I. Maxima and minima in rabbinical literature. *Scripta Mathematica*, 1, 53-55, 1932. ISIS

Keller, Henry. Numerics in old Hebrew medical lore. *Scripta Mathematica*, 1, 66-67, 1932. ISIS

Levy, Raphael. Recherches lexicographiques sur d'anciens textes français d'origine juive. 92 p. (*The Johns Hopkins Studies in Romance Literatures and Languages*, extra volume V). Baltimore, Johns Hopkins Press, 1932 ($ 2.50). ISIS

« L'objet de cette étude est de présenter des additions et corrections qui peuvent être faites dans les lexiques du vieux français, en utilisant tous les textes judéo-français accessibles. On y trouvera une énumération de mots ayant des significations ou des formes entièrement nouvelles ou mal interprétées jusqu'ici. Nous avons aussi relevé quelques exemples de mots qui ont une certaine valeur lexicographique à cause de leur rareté ou de leur absence dans des textes français d'origine non-juive. Ce travail n'a point la prétention d'être un répertoire complet du vocabulaire des Juifs en France au moyen âge. Comme les matériaux sont assez abondants, il fallait évidem-

ment faire un choix. Dans ce but l'auteur s'est reporté constamment au Glossaire hébreu-français du XIII[e] siècle, publié en 1905 par LOUIS BRANDIN et le regretté MAYER LAMBERT. Ce recueil a été certainement le plus utile des ouvrages consultés pour le présent travail. Avec le dictionnaire de GODEFROY, il a servi de guide principal pour le choix des mots à incorporer dans cette monographie. En principe, on a laissé de côté toutes les formes et tous les vocables qui sont traités correctement dans l'un ou l'autre de ces deux ouvrages ». (p. 7). J'ai indiqué l'importance de ce genre d'études dans mon *Introduction* (vol. 2, 699). L'auteur de celles-ci continue dignement l'œuvre de son maître D. S. BLONDHEIM. Il prépare en ce moment une édition des écrits astrologiques d'ABRAHAM IBN EZRA (*Isis*, 11, 171). G. S.

Rabbinowitz, Joseph. Mishnah Megillah. Edited with introduction, translation, commentary, and critical notes. X+142 p. Oxford, University Press, 1932. ISIS

Robinson, Theodore H.; Oesterley, W. O. E. A history of Israel. 2 vols. Vol. 1. From the Exodus to the fall of Jerusalem, 586 B.C. By THEODORE H. ROBINSON. XVI+496 p., 11 maps. Vol. 2: From the fall of Jerusalem 586 B.C., to the Bar-Kokhba revolt, A.D. 135. By W. O. E. OESTERLEY. XVI+500 p., 11 maps. Oxford, Clarendon Press, 1932. ISIS

Ruppin, Arthur. Soziologie der Juden. I: Die soziale Struktur der Juden. (Nach Vorlesungen an der Hebräischen Universität Jerusalem). 522 p., 32 pl. Berlin, Jüdischer Verlag, 1930. ISIS

Reviewed by the late MAX LÖHR, *OLZ*, 35, 478, 1932.

Sassoon, David Solomon. Ohel Dawid. Descriptive catalogue of the Hebrew and Samaritan manuscripts in the Sassoon Library, London. With seventy-three fascimiles. 2 vols. Vol. 1, LXIII+566 p.; vol. 2, p. 567-1112, indexes 1-276. Oxford, University Press, 1932 (£ 26.5 s.) ISIS

Sellin, Ernst. Geschichte des israelitisch-judischen Volkes. 2. Tl.: Vom babylonischen Exil bis zu ALEXANDER DEM GROSSEN. 197 p. Leipzig, QUELLE & MEYER, 1932. ISIS

Reviewed by W. STAERK, *DLZ*, 3, 1923-24, 1932.

Sidersky, D. La désignation biblique de certaines constellations. *Journal asiatique*, 218, 354-56, 1931. ISIS

Strack, Hermann L. Introduction to the Talmud and Midrash. Authorized translation on the basis of the author's revised copy

of the fifth German edition. XVII+374 p. Philadelphia, Jewish Publication Society of America, 1931. ISIS

Reviewed in *Jewish Quarterly Review*, 22, 437, 1932.

Welch, Adam C. Deuteronomy. The framework to the Code. Oxford, University Press, 1932. ISIS

The Zohar. Volume I. Translated by HARRY SPERLING and MAURICE SIMON. Introduction by J. ABELSON. London, Soncino Press, 1932. ISIS

13. — IRAN

Dawson, Miles Menander. The ethical religion of ZOROASTER. An account of what ZOROASTER taught, as perhaps the very oldest and surely the most accurate code of ethics for man, accompanied by the essentials of his religion. 271 p. London, MACMILLAN, 1932. ISIS

Hertz, Amelia. Die Kultur um den Persischen Golf und ihre Ausbreitung. IV+152 p., 15 fig. (*Beiträge zur alten Geschichte*, hrsg. von C. F. LEHMANN-HAUPT, 20. Beiheft). Leipzig, DIETERICH, 1930. ISIS

Reviewed by STEFAN PRZEWORSKI, *OLZ*, 34, 843-48, 1931; by O. NEUGEBAUER, *OLZ*, 34, 848-50, 1931.

Messina, Giuseppe (S.J.). Der Ursprung der Magier und die zarathustrische Religion. 102 p. (*Scripta Pontificii Instituti Biblici*). Rome, Pontificio Istituto Biblico, 1930. ISIS

Reviewed by L. D. BARNETT, *Journal of the Royal Asiatic Society*, 689-92, 1931.

Moghadam, Sadegh. Les mannes de Perse. Avec diverses notes sur l'histoire de la médecine en Orient et une étude critique sur l'origine de la manne des Hébreux. Préface de EM. PERROT. Paris, Librairie universelle, 1930. ISIS

Reviewed by J. M. FADDEGON, *Journal asiatique*, 219, 188, 1931.

Nyberg, H. S. Questions de cosmogonie et de cosmologie mazdéennes. *Journal asiatique*, 219, 1-134, 193-244, 1931. ISIS

14. — ISLAM

Aly, Zaki. La chirurgie arabe en Espagne. *Bulletin de la Société française d'histoire de la médecine*, 26, 236-44, 1932. ISIS

Amari, Michele. Storia dei Musulmani di Sicilia. Seconda edizione riveduta dal'autore. Curata da GIORGIO LEVI DELLA VIDA e CARLO ALFONSO NALLINO. Vol. 1, 1. 240 p. Catania, GUAITOLINI, 1930. ISIS

Arnold, Sir **Thomas W.** (d. 1930); **Guillaume, Alfred.** The legacy of Islam. XVI+416 p. Oxford, Clarendon Press, 1931. ISIS

Reviewed by WILLIAM THOMSON, *Speculum*, 7, 424-27, 1932; in *Jewish Quarterly Review*, 22, 443, 1932.

Arnold, Sir **Thomas W.** (d. 1930). The Old and New Testaments in Muslim religious art. Edited by H. A. R. GIBB. X+47 p., 19 pl. (Schweich Lectures of the British Academy, 1928). Oxford, University Press, 1932. ISIS

Bercher, L. Nouvelle charte de l'Université d'al-Azhar au Caire. Loi nº 49 de 1930. *Revue des études islamiques*, 241-75, 1931. ISIS

Bolus, E. J. The influence of Islam. A study of the effect of Islam upon the psychology and civilization of the races which profess it. 199 p. London, WILLIAMS, 1932. ISIS

Browne, Edward G. A descriptive catalogue of the oriental Mss. belonging to the late E. G. BROWNE. Completed and edited with a memoir of the author and a bibliography of his writings by REYNOLD A. NICHOLSON. XXII+325 p. Cambridge, University Press, 1932. ISIS

Creswell, K. A. C. Early Muslim architecture. Umayyads, early 'Abbāsids, and Ṭūlūnids. Part I., Umayyads, A.D. 622-750. Oxford, Clarendon Press, 1932. ISIS

Dumreicher, André von. Fahrten, Pfadfinder und Beduinen in den Wüsten Ägyptens. 244 p., 31 fig. München, Drei Masken, 1931. ISIS

Reviewed by M. MEYERHOF, *OLZ*, 35, 133, 1932.

Farmer, Henry George. An old Moorish lute tutor. *Journal of the Royal Asiatic Society*, 99-109, 379-89, 897-904, 1932. ISIS

1. Modes; 2. Furū'; 3. Syllables of solfeggio; 4. IBN SAB'IN; 5. IBN AL-KHAṬĪB AL-SALMĀNĪ; 6. Doctrine of ethos.

Farmer, H. G. Studies in Oriental musical instruments. VI+107 p. London, REEVES, 1931. ISIS

Reviewed by H. A. R. GIBB, *Journal of the Royal Asiatic Society*, 225-26, 1932. Collection of papers originally published in *J. R. A. S.*, 1925 to 1930.

Frankl, Theodor. Die Anatomie der Araber. I. Die Nomenklatur des Verdauungstraktes. Eine philologische und kulturhistorische Studie. 148 p. Prague, 1931. ISIS

Reviewed by MAX MEYERHOF, *Mitteilungen z. Gesch. d. Medizin*, 31, 150, 1932.

Fyzee, Asaf A. A. An introduction to the study of Mahomedan law. 44 p. Oxford, University Press, 1932. ISIS

Gandz, Solomon. Bemerkungen zum "Buch über die Ausmessung der Ringe des AḤMAD IBN 'OMAR AL-KARĀBĪSĪ". *Quellen und Studien zur Gesch. d. Math., Astronomie u. Physik*, Abt. B : Studien, 2, 98-105, 1932. ISIS

Remarks on the Kitāb misāḥat al-ḥalaq of AḤMAD IBN 'UMAR AL-KARĀBĪSĪ recently edited and translated in the same journal by E. BESSEL-HAGEN and O. SPIESS (vol. I, 502-40, 1931). I did not mention this author in vol. I of my *Introduction* because we do not know the date of his activity (except that it is anterior to the *Fihrist*). Moreover, his writings were practically unknown, this one being the first to be published. Any further study should take into account GANDZ's remarks as well as the editor's commentary.

G. S.

Gandz, Solomon. Der Hultsch-Cantorsche Beweis von der Reihenfolge der Buchstaben in den mathematischen Figuren der Griechen und Araber. *Quellen und Studien zur Gesch. d. Math., Astr. u. Phys.*, Abt. B : Studien, 2, 81-97, 1932. ISIS

" Man darf nun wohl behaupten, dass es uns gelungen ist, den Beweis von der Reihenfolge der Buchstaben auf griechischen Einfluss zu erschüttern, wenn nicht gänzlich zu widerlegen. Das Fehlen von w und j in den Figurenbezeichnungen muss nicht auf griechischen Einfluss zurückgehen."

Gibb, H. A. R. (editor). Whither Islam? A survey of modern movements in the Moslem world. 384 p. London, GOLLANCZ, 1932. ISIS

Gottheil, Richard. A Genizah fragment of a treatise on the sciences in general. *Jewish Quarterly Review*, 23, 163-80, 1932. ISIS

" The MS. British Museum numbered Or. 5565 C. contains among other fragments from the Cairo Genizah certain portions—alas only too few—of an Arabic treatise on the various sciences." " It is a risalah; and that which has remained deals, in the first place, with music; then there is a piece having to do with King and Rulership. This is followed by a small piece on domestic economy, and a piece on certain scientific terms used by the author; and, finally, by a table of contents. The copy was made by one SA'ĪD IBN DA'ŪD AL-YAMANĪ, in the year of the Greeks 1774, i.e. 1463 A. D.

Evidently, the fragments come from a copy in Hebrew letters of an Arabic treatise. There is absolutely nothing that is Jewish in it." Text in Hebrew script and English translation with notes. G. S.

Hobson, R. L. A guide to the Islamic pottery of the Near East. XVI+ 104 p., 39 pl. London, British Museum, 1932. ISIS

Hozayen, S. A. S. Some contributions of the Arabs to geography. *Geography*, 17, 117-28, 1932. ISIS

(1) The extension of knowledge of Southern Russia, Turkestan, the Far East, and the Sudan. (2) Social, economic and political geography. (3) World-maps of MAS'UDI and IDRISI. C. W. A.

Macdonald, Duncan B. A bibliographical and literary study of the first appearance of the Arabian Nights in Europe. *Library Quarterly*, 2, 387-420, 1932. ISIS

Elaborate bibliographical description and discussion of the early translations by ANTOINE GALLAND (d. 1715) and PÉTIS DE LA CROIX (d. 1713), the pirated editions, the English translation of them, the Turkish tales. G. S.

Massignon, Louis. L'influence de l'Islam au moyen âge sur la fondation et l'essor des banques juives. *Bulletin d'Etudes Orientales de l'Institut Français de Damas*, 1, 12 p., 1932. ISIS

« Le rôle financier de l'élément juif dans le monde, auquel un verset du Deutéronome semble déjà faire allusion et qui nous paraît classique, est un rôle accidentel qui ne lui a été imposé que tardivement : par l'État musulman. »

Patzeld, Erna. Die fränkische Kultur und der Islam mit besonderer Berücksichtigung der nordischen Entwicklung. IV+244 p. (*Veröff. d. Sem. f. Wirtschafts- u. Kulturgesch. an d. Univ. Wien*, H. 4). Baden, ROHRER, 1932. ISIS

Reviewed by HABERLING, *Mitteilungen z. Gesch. d. Medizin*, 31, 229, 1932.

Plessner, Martin. Die Geschichte der Wissenschaften im Islam als Aufgabe der modernen Islamwissenschaft. Ein Versuch. 36 p. (*Philosophie und Geschichte*. 31). Tübingen, MOHR, 1931. ISIS

Reviewed by MAX MEYERHOF, *OLZ*, 35, 668-69, 1932.

Renaud, H. P. J. La transmission des sciences par les Arabes au moyen âge occidental. *Bulletin de l'Institut d'hygiène du Maroc*, 4, 5-16, 1931. ISIS

Reviewed by PAUL DELAUNAY, *Bulletin de la Société française d'histoire de la médecine*, 26, 311-12, 1932.

Rihani, Ameen. Arabian peak and desert : travels in al-Yaman. IX+280 p., 14 pl. London, CONSTABLE, 1930. ISIS

Reviewed by D. S. M., *Journal of the Royal Asiatic Society*, 675-76, 1931.

Schwartz, Joseph J. Two magical manuscripts. *Scripta Mathematica*, 1, 44-52, fig., 1932. ISIS

Apropos of two late Arabic magical MSS. among those given by D. E. SMITH to Columbia University. G. S.

PART III

SYSTEMATIC CLASSIFICATION

Including only the material which could not be included in parts I and II. Hence studies on Japanese astronomy or on XIIIth century astronomy are not classified below under astronomy but above, respectively under Japan (in Part II) and C. XIII (in Part I).

I. — SCIENCE IN GENERAL

16. — HISTORY OF SCIENCE

Académie des sciences. Les membres et les correspondants de l'Académie Royale des sciences (1666-1793). XVI+265 p. Paris, L'institut de France, 1931. ISIS

Liste de tous les membres de l'ancienne Académie royale supprimée par la loi du 8 août, 1793. De brèves notes biographiques sont données pour chacun de ces membres, avec des références aux « éloges » s'il y a lieu. Cette liste est fort précieuse pour l'étude de l'histoire des sciences aux XVII^e^ et XVIII^e^ siècles et sera presque indispensable pour tous les historiens s'occupant de cette époque. Elle a été compilée par le Dr. PAUL DORVEAUX à qui nous devons déjà tant de travaux importants. G. S.

Bugge, Günther. Some problems relating to history of science and technology. *Jour. Chem. Ed.*, 9, 1567-75, 1932. ISIS

Dingler, Hugo. La notion de système dans l'histoire et la philosophie des sciences. *Archeion*, 13, 210-25, 1931. ISIS

(History of Science. Congress of Warsaw, 1933). VII^e^ Congrès international des sciences historiques. Sections d'histoire des sciences et de la médecine. *Isis*, 18, 330-32, 1932. ISIS

Johnson, E. H. History of science source material in college libraries. *Science*, 72, 340-41, 1930. ISIS

Sarton, George. Introduction to the History of Science. Vol. II: From the time of RABBI BEN EZRA to ROGER BACON. In two parts. XXXV+1251 p. Baltimore, WILLIAMS and WILKINS, 1931. ISIS

Reviewed by TENNEY L. DAVIS, *Journal of Chemical Education*, 9, 1665-66, 1932; by F. M. G. DE FEYFER, *Bijdragen tot de geschiedenis der geneeskunde*, 12, 137, 1932; by KLEBS, *Mitteilungen zur Geschichte der Medizin*, 31, 258, 1932; by P. MASSON-OURSEL, *Journal asiatique*, 218, 372, 1931; by FRANCIS R. PACKARD, *Annals of Medical History*, 4, 318-19, 1932; by C. SINGER, *Times Literary Supplement*, p. 676, London, Sept. 29, 1932; by HENRY DE VARIGNY, *Revue générale des sciences*, 43, 494, 1932; and in *Quarterly Review of Biology*, 7, 376, 1932.

Sarton, George; Pogo, Alexander. Thirty-third Critical Bibliography of the history and philosophy of science and of the history of civilization (to December 1931). *Isis*, 18, 334-429, 1932. ISIS

Contains 610 items contributed by 9 scholars.

Testi, Gino. Alcuni notevoli anniversari scientifici per il 1932. *Rivista di Storia delle Scienze med. e natur.*, 23, 34-35, 1932. ISIS

Weber, Maurice. Sur l'introduction de l'histoire des sciences dans les humanités scientifiques. *L'Enseignement scientifique*, 6, 8-15, 1932. ISIS

Wilson, Grove. Great men of science. Their lives and discoveries. XI+397 p., 11 portrs. New York, Garden City, 1932 ($ 1.00). ISIS

This book appeared in 1929 as "The human side of science" containing twenty-eight biographies. The biologists included are HIPPOCRATES, ARISTOTLE, GALEN, PARACELSUS, HARVEY, LEEUWENHOEK, LAVOISIER, LAMARCK, PASTEUR, DARWIN, and MENDEL; the physicists, ARCHIMEDES, NEWTON, FARADAY, HERTZ, and EINSTEIN; the astronomers, PTOLEMY, COPERNICUS, TYCHO BRAHE, KEPLER, and GALILEO; others are THALES, PYTHAGORAS, ANAXAGORAS, DEMOCRITUS, ROGER BACON, and LANGLEY. C. A. K.

18. — PHILOSOPHY OF SCIENCE

Lalande, André. La pensée scientifique et sa tendance fondamentale. *Revue générale des sciences*, 43, 309-13, 1932. ISIS

Northrop, F. S. C. Science and first principles. XIV+299 p. Cambridge, Harvard University Press, 1931. ISIS

Reviewed by C. G. HEMPEL, *DLZ*, 3, 1716-21, 1932; by THOMAS GREENWOOD, *Nature*, 130, 453-55, 1932.

II. — FORMAL SCIENCES
(Knowledge of forms)

20. — MATHEMATICS

Almeida e Vasconcellos, Fernando de. História das matemáticas na antiguidade. XXIV+653 p. Lisbon, AILLAUD e BERTRAND, 1925. ISIS

Reviewed by DAVID EUGENE SMITH, *Scripta Mathematica*, 1, 79-80, 1932.

Archibald, R. C. BONCOMPAGNI's Bullettino. *Scripta Mathematica*, 1, 87, 1932. ISIS

Archibald, R. C. Formula for the frustum of a square pyramid. *Scripta Mathematica*, 1, 91, 1932. ISIS

Archibald, R. C. The Hamburg mathematical society publications. *Scripta Mathematica*, 1, 85-86, 1932. ISIS

Faddegon, J. M. Note au sujet de l'Aboujād. *Journal asiatique*, 220, 139-48, 1932. ISIS

L'auteur explique la disposition probable de la table de multiplication, de l' « abaque » de l'antiquité pour 60. Le mot aboujād est comme notre abécé mais se rapporte à l'ordre ancien de l'alphabet arabe tel qu'il est conservé dans les valeurs numériques des lettres. G. S.

Ginsburg, J. On the use of the term cuento. *Scripta Mathematica*, 1, 87, 1932. ISIS

Karpinski, Louis C. Rare mathematical books in the University of Michigan Library. *Scripta Mathematica*, 1, 63-65, 1932. ISIS

Keyser, Cassius Jackson. The meaning of mathematics. *Scripta Mathematica*, 1, 15-28, 1932. ISIS

Locke, L. Leland. The ancient Peruvian abacus. *Scripta Mathematica*, 1, 37-43, 3 figs., 1932. ISIS

The author whose previous publications on quipu have been reviewed in *Isis* (6, 219; 10, 292; 11, 548) adds this note largely based upon the Ms. discovered in the Royal Library of Copenhagen, written by a Peruvian Indian, D. FELIPE HUAMAN POMA DE AYALA sometime between 1583 and 1613. "The evidence is conclusive that the quipu was used as a means of recording numbers in a decimal scale, the count having been made oraliy or with objects as aids, and the calculations performed on some abacus device, as is indicated in the POMA DE AYALA drawing." (p. 43). G. S.

Loria, Gino. Le matematiche nei quaranta secoli della loro storia. *Atti della Società Ligustica di Scienze e Lettere* di Genova, 11, 245-324, 1932. ISIS

" Queste conferenze pongono un quadro sintetico dell'evoluzione della matematica attraverso i secoli. Nella I trovasi esposto quanto oggi si conosce intorno all' aritmetica ed alla geometria degli Egiziani, degli Assiro-Babilonesi, degli Indiani e degli antichi Cinesi, non senza segnalare le relative questioni storiche tuttora irresolute. La II è tutta consacrata all' antica Grecia e si chiude con l'osservazione che il pensiero ellenico è tuttora vivo e operante nella matematica odierna. La III abbraccia le ricerche matematiche compiute a partire dal Rinascimento sino a tutto il secolo XVII; campeggiano ivi le figure di LEONARDO FIBONACCI, CARDANO e TARTAGLIA, GALILEO e KEPLERO, NEWTON e LEIBNIZ. La profonda metamorfosi subita dalla matematica tutta per effetto dell' invenzione della geometria analitica, del calcolo infinitesimale e di altre nuove branche è descritta nella IV conferenza, la quale si chiude con larghi cenni intorno all'orientamento attuale delle ricerche nel campo delle scienze esatte."

Rome, A. Histoire des mathématiques. *Revue des Questions scientifiques*, 261-88, Sept. 1932. ISIS

L'auteur discute sous ce titre un assez grand nombre de travaux récents qu'il serait trop long d'énumérer. Son analyse est subdivisée comme suit : 1. Arithmétique babylonienne; 2. Géométrie babylonienne; 3. Astronomie babylonienne; 4. Les débuts de la science grecque; 5. Calcul de la racine carrée chez les Grecs; 6. Quelques pages de PAPPUS; 7. Quelques comètes historiques; 8. Sciences arabes; 9. Transmission de la science antique. G. S.

Scripta Mathematica. A quarterly journal devoted to the philosophy, history, and expository treatment of mathematics. JEKUTHIEL GINSBURG, editor. Associate editors : RAYMOND CLARE ARCHIBALD, CASSIUS JACKSON KEYSER, LOUIS CHARLES KARPINSKI, GINO LORIA, LAO GENEVRA SIMONS, and DAVID EUGENE SMITH. Vol. 1, no. 1, 92 p. September, 1932. Published by Yeshiva College, Amsterdam Avenue and 186th St., New York. ISIS

We salute with special pleasure the appearance of this new periodical, the first number of which is remarkably good. Its contents are analyzed in the present bibliography. May it emulate the *Bibliotheca Mathematica* and live longer ! G. S.

III. — PHYSICAL SCIENCES
(Knowledge of inorganic nature)

22. — MECHANICS
(Including celestial and atomical mechanics)

Heyl, Paul R. Old and new ideas regarding gravitation. *Jour. Chem. Ed.*, 9, 1897-1907, 1932. ISIS

A review of various ideas regarding gravitation from ARISTOTLE to EINSTEIN. "The defective features of the earlier hypotheses are pointed out and EINSTEIN's method of avoiding them is indicated. It is to be understood that the development of our ideas on this subject is not to be supposed to end with EINSTEIN but that other hypotheses may be expected to cut still more closely to the line in the future." T. L. D.

23. — ASTRONOMY

Boll, Franz (1867-1924). Sternglaube und Sterndeutung. Die Geschichte und das Wesen der Astrologie unter Mitwirkung von CARL BEZOLD. Vierte Auflage, von W. GUNDEL. XIV+230 p., 24 pl., 2 star charts. Leipzig, TEUBNER, 1931. ISIS

Reviewed by WIELEITNER, *Mitteilungen zur Geschichte der Medizin*, 31, 22, 1932. For third edition, 1926, see *Isis*, 9, 476-77.

Milne, E. A. The white dwarf stars, being the Halley lecture delivered on 19 May 1932. 32 p., 3 fig. Oxford, Clarendon Press, 1932. (*s* 0.85). ISIS

"We now see the truth of BESSEL's prophetic remark, originated by his pursuit of researches initiated by HALLEY. HALLEY discovered the proper motions of the stars by a study of Sirius. BESSEL discovered the irregularity of the proper motion of Sirius and predicted the existence of an invisible companion, subsequently found. ADAMS determined its spectrum, and EDDINGTON computed its density and accounted for its high value by the theory of ionization and the kinetic theory of gases. EINSTEIN's theory of relativity allowed these inferences to be confirmed. R. H. FOWLER identified the dense state with that of a degenerate gas, in the light of the researches of FERMI and DIRAC. FOWLER's researches opened the way for an intensive study of the configurations of masses consisting of a degenerate gas at a high density surrounded by a gaseous envelope of more familiar type. The properties of their configurations not only give insight into the structure of the white dwarf stars, but suggest possibilities as to the structure of the stars generally. These properties afford possible explanations of the nova phenomenon, the Cepheid phenomenon, the mass-luminosity correlation, the relationships of the massive highly luminous stars to one another, and lastly the general relationship of the dense stars like the white dwarfs and the nuclei of planetary nebulae to the other stars of nature. To repeat

BESSEL's words concerning the first known white dwarf : ' These phenomena... seem to possess interest in relation to our knowledge of the physical constitution of the universe.' "

24. — PHYSICS

Brandt, Otto. Alte Normalgewichte. *Beiträge z. Gesch. d. Techn. u. Ind.*, 21, 155-57, 6 fig., 1932. ISIS

Broglie, Maurice de. L'œuvre de la physique moderne. *Revue générale des sciences*, 43, 73-76, 1932. ISIS

Discours prononcé au Congrès de Nancy par MAURICE DE BROGLIE, Président de l'Association française pour l'Avancement des Sciences.

Hennig, R. Die Frühkenntnis der magnetischen Nordweisung. *Beiträge z. Gesch. d. Techn. u. Ind.*, 21, 25-42, 1932. ISIS

25. — CHEMISTRY, PHYSICO-CHEMISTRY, INDUSTRIAL CHEMISTRY

Nierenstein, M. Incunabula of tannin chemistry. A collection of some early papers on the chemistry of the tannins reproduced in facsimile and published with annotations. VI+168 p., London, ARNOLD, 1932. ISIS

"For over thirty years I have been interested in the chemistry of the tannins. During this time I have had the opportunity of seeing many of the oldest publications on the subject. The present volume is a selection of a few which have struck me as remarkably interesting, depicting, as they do, the early progress in this field of research... By " incunabula " I understand here the early works of tannin chemistry, carried out in the " cradle " days of this subject."

Contents : Frontispiece. From " Conamen Mappae generalis Medicamentorum Simplicium," by G. C. WÜRTZ; Argentorati (1778).—1. GALLA, Gallopffel from Hortus Sanitatis (1485).—2. J. B. PORTA, How you may write in an egg (1589).—3. O. TACHENIUS, Action of vitriol on salts of Vegetables (1666).—4. Sur le principe astringent végétal [from vol. III of Élémens de chymie by GUYTON DE MORVEAU, MARET and DURANDE] (1777).—5. G. PIEPENBRING, Ueber die Säure der Gallapfel (1786).—6. C. W. SCHEELE, Ueber das wesentliche Galläpfelsalz (1787).—7. D. RICHTER, Ueber den zusammenziehenden Grundstoff der Galläpfel (1787).—8. C.L. KUNSEMÜLLER, Chemische Untersuchung über die Galläpfel (1787).—9. Sir HUMPHRY DAVY, Observations on different methods of obtaining gallic acid (1803).—10. E. T. P. BOUILLON-LAGRANGE, Recherches sur le tannin et sur l'acide gallique (1805).—11. C. H. PFAFF, Ueber die nach SCHEELE's, RICHTER's und durch Sublimation bereitete Galläpfelsäure (1808). Ueber eine Eigenthümlichkeit des Geschmacks der adstringirenden Substanzen (1808).—12. G. BIGGIN, Experiments to determine quantity of tannin principle and Gallic acid,

contained in the Barks of various Trees (1799).—13. Sir HUMPHRY DAVY, Some Experiments and Observations on the constituent parts of some Astringent Vegetables (1803).—Annotations. L. G.

Partington, J. R. Everyday chemistry. VIII+668 p. London, MACMILLAN, 1929; reprinted 1931. (7s. 6). ISIS

A very interesting and readable textbook of elementary chemistry, abundantly illustrated. It consists of Part I, Chemical history and theory, p. 3-269; part II, Some non-metallic elements and their important compounds, p. 273-488; and part III, Organic chemistry and metals, p. 491-668. The book contains an excellent survey of the history of chemistry. Facts of the history are so mingled with the account of present chemistry that the student who uses the book will surely see the essential identity of the questions, what are the facts? and what is their interest? with the question, how did the facts come to be discovered? A good book to bring science to a student of the humanities, and a good means of humanizing a student of science at the beginning of his course of study. T. L. D.

Philbrick, F. A.; Holmyard, E. J. A text book of theoretical and inorganic chemistry. VIII+803 p. London, DENT, 1932 (10/6). ISIS

This excellent text is constructed upon a somewhat different plan from that which has generally been used recently in this country for text books of general chemistry. It contains, Part I, an Historical introduction, p. 1-56, from the earliest times to CANNIZZARO, covering the period in which the present era of chemistry was incubated; Part II, General and theoretical, p. 59-318, containing eleven chapters headed respectively, Atoms and molecules, The structure of matter, Dynamics of chemical change, The nature of solution, Heterogeneous equilibrium, Homogeneous equilibrium, Chemical energy, Electrochemistry and photochemistry, Colloid and surface chemistry, Radioactivity and atomic structure, and The electron theory of valency, and Part III, The elements and their compounds, p. 321-777, eleven chapters dealing respectively with hydrogen and oxygen, with nitrogen, and with the elements of the nine groups of the periodic table. Thus, the structure of the work is not unlike that of BOERHAAVE's *Elementa chemiae*, which was published about two centuries ago and consisted of three parts, history, theory, and practice. As would be expected of a book bearing the name of HOLMYARD, it is liberally sprinkled throughout, and enriched, with allusions to the historical development of ideas and to the progress of discovery. It is up to date with respect to recent developments and contains considerable material on compounds of the rarer elements. T. L. D.

Ruska, J. Quelques problèmes de littérature alchimiste. *Annales Guébhard-Séverine*, 7, 156-73, 1931. ISIS

Étude d'ensemble de cette question infiniment complexe par un des savants qui ont fait le plus d'efforts pour la résoudre. Voici un court extrait (p. 166): « Tout ce que ces traditions disent de KHĀLID IBN YAZĪD et de DJA'FAR et de l'intérêt qu'ils portaient à l'alchimie, n'est que pure légende; l'auteur

des innombrables ouvrages attribués à DJĀBIR ne peut avoir écrit que vers la fin du IX^e^ siècle et AL-RĀZĪ est la seule personnalité dont l'historicité soit incontestable. Le contraste frappant que l'on découvre entre la symbolique grecque et les conceptions absolument rationnelles et expérimentales de RĀZĪ soulève encore un autre problème. Où RĀZĪ a-t-il acquis son nouveau savoir et sa formation expérimentale? Le problème est identique, mais plus complexe encore en ce qui concerne les nombreux ouvrages portant le nom de DJĀBIR." G. S.

Vickery, Hubert Bradford and **Schmidt, Carl L. A.** The history of the discovery of the amino acids. *Chemical Review*, 9, 169-318, 1931. ISIS

"This paper is written with the object of showing in some detail how the advances in knowledge of the qualitative composition of proteins, with respect to the amino acids that they yield on hydrolysis, have come about. The term amino acids as used here is, of course, restricted to the substances of this class that have been found to result from the hydrolysis of proteins. The discovery of some of these has been the result of mere chance; others have been the fruit of a well-conceived hypothesis; many were found by investigators bold enough to depart from long-established custom and apply a new method or a new reagent. It will become clear, however, that the great rewards have come only to those who possessed intelligence, skill, and patience of the highest order; the discoverers of the amino acids are among the élite of science. Proteins have provided problems for investigation for centuries..." "Modern protein chemistry dates, however, from 1820, when BRACONNOT prepared glycine from gelatin in the course of his attempt to see if proteins behave like starch and are decomposed by acids with the production of sugar. Progress at first was slow, but in recent years it has been rapid indeed; nevertheless the complete solution of the problem of protein composition has not yet been attained." (p. 171). After a short introduction including a chronological table (1810 to 1922), the following chapters deal with individual amino acids. Bibliography (415 titles). G. S.

Weeks, Mary Elvira. The discovery of the elements. XI. Some elements isolated with the aid of potassium and sodium : zirconium, titanium, cerium, and thorium. *Jour. Chem. Ed.*, 9, 1231-1243, 1932. XII. Other elements isolated with the aid of potassium and sodium : berylium, boron, silicon, and aluminum. *Ibid.*, 9, 1386-1412, 1932. XIII. Some spectroscopic discoveries. *Ibid.*, 9, 1413-34, 1932. XIV. The periodic system of the elements. *Ibid.*, 9, 1593-1604, 1932. XV. Some elements predicted by MENDELEEFF. *Ibid.*, 9, 1605-19, 1932. XVI. The rare earth elements. *Ibid.*, 9, 1751-73, 1932. XVII. The halogen family. *Ibid.*, 9, 1915-39, 1932. ISIS

This series of excellent articles would make a fine book. T. L. D.

White, J. H. The History of the Phlogiston Theory. 192 p., London, ARNOLD, 1932. ISIS

Conclusions : " The Phlogiston Period was a halfway stage between alchemy and modern chemistry. 2. STAHL's theory owed little to BECHER and nothing to BOYLE. 3. The gain in weight of calces only presented a problem through the misinterpretation of STAHL's original idea. STAHL conceived phlogiston as a principle; his disciples turned it into a material. 4. The " negative weight " explanation of the above problem was quite foreign to STAHL and was adopted by only a minority of phlogistonists. 5. While in no way depreciating the work of LAVOISIER, the ground had been better prepared for him by his predecessors than is generally realized. It was LAVOISIER, however, and not BOYLE who dealt the death-blow to Aristotelian dogma. 6. Under the name " caloric," phlogiston persisted in reality until heat was recognised as a form of energy and not as a material substance. 7. LAVOISIER could not clear up all difficulties presented by his theory and consequently the Phlogiston Theory died a lingering death. 9. The discovery of gases largely increased the vulnerability of the Phlogiston Theory. 9. The Phlogiston Theory was a help to progress as a unifying principle, but was hindrance in many ways. It did little to stimulate research."

26. — TECHNOLOGY

(For mining, see 32. Geology ; for industrial chemistry, 25. Chemistry. See also Arts and crafts under 45.)

Claas, Wilhelm. Vom Draht und den Altenaer Drahtrollen. *Beiträge z. Gesch. Techn. Ind.*, 21, 133-42, 8 fig., 1932. ISIS

Claas, Wilhelm. Die Wassermühlen der ehemaligen Grafschaft Mark. Ihr Werden, Sein und Vergehen. *Beiträge z. Gesch. Techn. Ind.*, 21, 165-69, 8 fig., 1932. ISIS

Hendrichs, Franz. Die Solinger Schwert- und Messerzünfte im 17. und 18. Jahrhundert. *Beiträge z. Gesch. Techn. Ind.*, 21, 85-96, 7 fig., 1932. ISIS

Horwitz, Hugo Th. Über das Aufkommen des Zahnrades. *Beiträge z. Gesch. Techn. Ind.*, 21, 150-52, 6 fig., 1932. ISIS

Horwitz, Hugo Th. Über das Gesetz vom Gebrauchswechsel und die Entwicklungsprinzipien bei einfachen technischen Gebilden. *Beiträge z. Gesch. Techn. Ind.*, 21, 123-30, 8 fig., 1932. ISIS

Hughes, A. A. Bell founding. *Transactions of the Newcomen Society*, 10, 36-45, 1929-30. ISIS

(Newcomen Society). Analytical bibliography of the history of engineering and applied science. Part VIII. *Transactions of the Newcomen Society*, 10, 121-34, 1929-30. ISIS

Nicol, Hugh. Agricultural sources of mechanical information. *Transactions of the Newcomen Society*, 10, 115-19, 1 fig., 1929-30. ISIS

Reichelt, Hans. Geschichte der Idar-Obersteiner Edelsteinindustrie. *Beiträge z. Gesch. Techn. Ind.*, 21, 74-78, 5 fig., 1932. ISIS

Thiel, Viktor. Die geschichtliche Entwicklung der Papiererzeugung in Österreich. *Beiträge z. Gesch. Techn. Ind.*, 21, 103-10, 11 fig., 1932. ISIS

Zuman, F. Die Papiermachéindustrie in Böhmen. *Beiträge z. Gesch. Techn. Ind.*, 21, 111-14, 1932. ISIS

IV. — BIOLOGICAL SCIENCES

(Knowledge of organic nature)

27. — BIOLOGY

(*Generalities*, " *Natural history.*")

Acta Phaenologica. Vol. 1, 1931, The Hague. ISIS

" Phenology is the science that teaches of the influence of external conditions (weather, situation, soil) upon moment and course of the periodical events of life. Originally limited to an enumeration of scientific data, it later became a separate branch of biology. It is connected with meteorology and geography as well as with other theoretic and applied sciences. It has a wide and valuable application agriculturally. A considerable amount of data on phenological phenomena has been assembled for many years, but this material was distributed over so many different journals and papers that it cannot be readily referred to. This has proven to be an obstacle, because specific information on wide areas, over a period of years is of the greatest importance to phenology. The Phenological Association of the Netherlands has taken the initiative by founding a special International Journal of Phenology."

✓ **Exell, A. W.** Barometz : the vegetable lamb of Scythia. *Natural History Magazine*, 3, 194-200, 1932. ISIS

" The vegetable lamb is a composite myth consisting of elements taken from the cotton plant, a Jewish legend and a Chinese fern-rhizome artificially shaped to resemble an animal." Extracts, with figures, from Sir JOHN MADEVILLE, Friar ODORIC, Rabbi SIMEON OF SENS (c. 1230), Baron VON HEBERSTEIN (1549), and later writers. C. W. A.

Hill, Sir Leonard Erskine. Philosophy of a biologist. VIII+88 p. London, ARNOLD, 1930. ISIS

Hjort, Johan. The emperor's new clothes. Confessions of a biologist. Translated from the Norwegian by A. G. JAYNE. 328 p. London, WILLIAMS and NORGATE, 1931. ISIS

Joad, Cyril Edwin Mitchinson. The future of life : a theory of vitalism. New edition. XIII+168 p. New York, PUTNAM, 1928. ISIS

May, Raoul M. La transplantation animale. 352 p., 170 fig. Paris, GAUTHIER-VILLARS, 1932. (70 fr.) ISIS

Synthèse de tous les travaux relatifs à la transplantation animale, surtout de ceux qui sont susceptibles d'orienter de nouvelles recherches. Il y a de brèves indications historiques au commencement des chapitres (voir par ex. p. 173) et des notes bibliographiques assez étendues à la fin de chacun d'eux.

« La méthode de la greffe ou transplantation animale ne constitue pas un problème. C'est une technique qui peut servir à élucider toute une série de questions biologiques se rapportant soit à l'embryon, soit à l'adulte. Utilisée par les anatomistes, elle a servi à l'interprétation de la spécificité cellulaire, des corrélations entre les divers tissus, de la formation des cellules et organes au cours de l'ontogénèse. Entre les mains des physiologistes cette méthode a été précieuse pour l'observation des fonctions d'organes isolés de leur milieu habituel, ou soustraits à l'influence des nerfs, pour mettre en lumière les réactions de défense des organismes vis-à-vis de tissus étrangers plus ou moins éloignés dans leur origine et leur constitution, pour créer, enfin, une source d'excitations spécifiques d'une certaine durée. D'une façon générale on peut envisager la greffe comme une pénétration dans un organisme d'une ou plusieurs cellules qui sont étrangères, ou bien qui sont originaires d'une autre partie du même organisme. Dans ce sens, et ainsi que l'ont fort bien montré O. HERTWIG et LEO LOEB, la fécondation est une forme de greffe, et le développement de presque toutes les catégories d'organismes débute par une réaction spéciale à cette transplantation intracellulaire fertilisante. Dans la fécondation comme dans la greffe il existe une incompatibilité croissante entre des cellules d'espèces de plus en plus éloignées. » (p. 1). Le Dr. MAY qui écrit avec une égale facilité en français, en anglais, et en espagnol, est bien connu déjà en dehors du cercle restreint de sa spécialité par sa traduction anglaise de l'œuvre fondamentale de SANTIAGO RAMÓN Y CAJAL (Oxford, 1928; *Isis*, 12, 428) et par ses comptes rendus par ex., celui relatif au même auteur (*Isis*, 8, 498-503). G. S.

Mitchell, Sir Peter Chalmers. Materialism and vitalism in biology : the Herbert Spencer lecture delivered at Oxford, June 3, 1930. 30 p. Oxford, Clarendon Press, 1930. ISIS

Poll, Heinrich. Zwillinge in Dichtung und Wirklichkeit. 52 p. (Sonderdruck aus *Zeitschr. f. d. gesamte Neurol. u. Psychiatr.* Bd. 128, H. 1-4). Berlin, SPRINGER, 1930. ISIS

Reviewed by FRIEDRICH PFISTER, *DLZ*, 2, 2249-50, 1931.

Rignano, Eugenio. The nature of life. Translated by N. MALLINSON. x+168 p. (*International Library of Psychology, Philosophy and Scientific Method.*) London, KEGAN PAUL, 1930. ISIS

Rosa, Daniel. L'Ologénèse : nouvelle théorie de l'évolution et de la distribution géographique des êtres vivants. Adapté de l'italien par l'auteur. XII+368 p. (*Bibliothèque de philosophie contemporaine.*) Paris, ALCAN, 1931. ISIS

Reviewed by A. K., *Nature*, 128, 429-30, 1931.

Stomps, Theodoor Jan. Fünfundzwanzig Jahre Mutationstheorie. Vortrag, gegen Jahresschluss 1929 gehalten für die Mitglieder der wiss. Ges. Diligentia im Haag. III+68 p., 2 fig. Jena, FISCHER, 1931. ISIS

Reviewed by ZAUNICK, *Mitteilungen z. Gesch. d. Medizin*, 31, 128, 1932.

Strohl, J. Missbildungen im Tier- und Pflanzenreich. Versuch einer vergleichenden Betrachtung. 62 p., 17 fig. Jena, FISCHER, 1929. ISIS

Reviewed by ZAUNICK, *Mitteilungen zur Gesch. d. Medizin*, 29, 156, 1930.

Thomson, Sir J. Arthur. The great biologists. VIII+176 p. (*The Great Scientists* Series). London, METHUEN, 1932. ISIS

Vialleton, Louis. L'origine des êtres vivants. L'illusion transformiste. VI+395 p. Paris, PLON, 1929. ISIS

Reviewed by L. CUÉNOT, *Revue générale des sciences*, 41, 28-9, 1930.

Woodger, Joseph Henry. Biological principles. A critical study. XII+498 p. (*International library of psychology*). London, PAUL, 1929. ISIS

28. — BOTANY

(*Agronomy, phytopathology, palaeobotany*)

Agricultural history. Quarterly journal of the Agricultural History Society of America. *Nature*, 129, 432, 1932. ISIS

Baldacci, Antonio. Le fonti della flora albanese. *Bull. Soc. Adriat. Sc. Nat.* 29, 27-48, 1926-27. ISIS

Barger, George. Ergot and ergotism : a monograph based on the Dohme lectures delivered in Johns Hopkins University, Baltimore. XVI+279 p., 6 pl. London, GURNEY and JACKSON, 1931. ISIS

Bews, J. W. The ecological viewpoint. *Nature*, 128, 245-48, 1931. ISIS

Bose, Sir Jagadis Chunder. Growth and tropic movements of plants. XXIX+447 p. London, 1929. ISIS

Reviewed by L. J. F., *Nature*, 125, 438-41, 1930.

(Botany). International address book of botanists. Being a directory of individuals and scientific institutions, universities, societies, etc., in all parts of the world interested in the study of botany. Prepared in accordance with a resolution passed at the fifth International Botanical Congress, Cambridge, 1930. XVI+605 p. London, BAILLIÈRE, TINDALL, and COX, 1932. ISIS

Burdett, Frederick David. The Odyssey of an orchid hunter. Edited and annotated by PERCY J. KING. 320 p., front., pl. London, JENKINS, 1931. ISIS

Cook, O. F. The debt of agriculture to tropical America. *Annual Report of the Smithsonian Institution* for 1931, p. 491-501, 7 pl. Washington, 1932. ISIS

Reprinted from the *Bulletin of the Pan American Union*, September, 1930.

Cornish, Vaughan. National parks : and the heritage of scenery. XI+139 p. London, PRAED, 1930. ISIS

Reviewed by J. R., *Nature*, 126, 393-94, 1930.

Corti, Egon Caesar Conte. Die trockene Trunkenheit. Ursprung, Kampf und Triumph des Rauchens. 343 p., 64 fig. Leipzig, 1930. ISIS

Darmstaedter, Ernst. Der Naturselbstdruck. *Philobiblon*, 3, 373-79, 5 fig., 1930. ISIS

Douglass, A. E. Tree rings and their relation to solar variations and chronology. *Annual Report of the Smithsonian Institution* for 1931, p. 304-13, 5 pl., Washington, 1932. ISIS

Gabrieli, G. Due codici iconografici di piante miniate, nella Biblioteca Reale di Windsor. A proposito di Cimeli Lincei. *Atti R. Accad. Naz. dei Lincei*, Rendiconti, Cl. Sc. Fis., 10, 531-38, 2 fig., 1929. ISIS

Huntingford, G. W. B. Ancient agriculture. *Antiquity*, 6, 327-37, 10 fig., 1932. ISIS

Landau, Paul. Das Blumenbildnis bei alten und neuen Meistern. 16 p., 47 illus. Berlin, Verlag d. Gartenschönheit, 1929. ISIS

Reviewed by ZAUNICK, *Mitteilungen z. Gesch. d. Medizin*, 29, 220-21, 1930.

Laufer, Berthold; Hambly, Wilfrid D.; Linton, Ralph. Tobacco and its uses in Africa. 45 p., 6 pl. Chicago, Field Museum of Natural History, 1930. ISIS

Marzell, Heinrich. Unsere Heilpflanzen, ihre Geschichte und ihre Stellung in der Volkskunde. 240 p., 38 fig. München, LEHMANN, 1930. ISIS

Maurizio, Adam. Histoire de l'alimentation végétale depuis la préhistoire jusqu'à nos jours. Traduit par F. GIDON. 672 p., 82 fig. Paris, PAYOT, 1931. ISIS

McNair, James Birtley. Indian corn. 33 p., fig. (*Field Museum of Nat. Hist. Dpt. of Botany*, leaflet 14). Chicago, Field Museum of Nat. Hist., 1930. ISIS

Nelmes, Ernest; Cuthbertson, William. Curtis's Botanical Magazine dedications, 1827-1927: portraits and biographical notes. XXI+400 p., 100 pl. London, QUARITCH, 1931. ISIS

Netolitzky, Fritz. Zur Geschichte der ersten Auffindung der Heil- und Gewürzpflanzen. *Heil- und Gewürzpflanzen*, Freising-München, 12, 152-60, 1930. ISIS

Pedrotti, G.; Bertoldi, V. Nomi dialettali delle piante indigene del Trentino e della Ladina Dolomitica. Presi in esame dal punto di vista della botanica, della linguistica e del folclore. Con 100 illustr. e 11 cartine. XII+588 p. Trenta, MONAUNI, 1930. ISIS

Reviewed by MARZELL, *Mitteilungen z. Gesch. d. Medizin*, 30, 35-6, 1931.

Roberts, Herbert Fuller. Plant hybridization before MENDEL. Princeton University Press, 1929. ISIS

Reviewed by ROBERT K. NABOURS, *Science*, 72, 274-75, 1930.

Thellung, Albert. Die Entstehung der Kulturpflanzen. Hrsg. v. J. BRAUN-BLANQUET. 91 p. *Naturwissensch. u. Landwirtsch.* Hrsg. v. F. BOAS, C. NEUBERG, A. RIPPEL, H. 16). Freising-München, DATTERER, 1930. ISIS

Reviewed by JOH. MATTFELD, *DLZ*, 1, 857-61, 1930.

Vavilov, Nikolai Ivanovich. The rôle of Central Asia in the origin of cultivated plants. *Bull. Applied Botany, Genetics, and Plant Breeding*, 26, 1-44, Leningrad, 1931. (Russian, with English summary). ISIS

Ward, Francis Kingdon. Plant hunting on the edge of the world. 383 p. London, GOLLANCZ, 1930. ISIS

Werth, Emil. Wie alt ist die Erkenntnis der Sexualität der Pflanzen? (Zur Geogr. u. Gesch. d. Kulturpflanzen u. Haustiere, 1). *Ber. Dt. Bot. Ges.*, 47, 608-13, 1 fig., 1929. ISIS

Wilde, Julius. Die Färberpflanzen der Bayerischen Rheinpfalz in der Zeit von 800-1800. *Mitt. Pfälz. Ver. Naturkde. Pollichia*, 3, 147-200, 14 fig., 1930. ISIS

Reviewed by ZAUNICK, *Mitteilungen z. Gesch. d. Medizin*, 31, 213, 1932.

29. — ZOOLOGY

Arndt, W. Die ältesten bildlichen Darstellungen von Schwämmen. *Sitzgsber. Ges. naturforsch. Freunde*, 125-54, 30 fig., Berlin, 1931. ISIS

Reviewed by ZAUNICK, *Mitteilungen zur Geschichte der Medizin*, 31, 36, 1932.

Bannerman, D. A. The birds of tropical West Africa, with special reference to those of the Gambia, Sierra Leone, the Gold Coast and Nigeria. Vol. I, LXXV+376 p. London, Crown Agents for the Colonies, 1930. ISIS

Reviewed in *Natural History Magazine*, 3, 77-8, 1931. "The chapter on 'Ornithological history' gives an account of the most important field work done in the West African Colonies from 1690 to 1929. C. W. A.

Bodenheimer, Fritz S. Tabellen des vor-linnéischen Insektenbestandes. 176 p. Berlin, JUNK, 1929. ISIS

Brass, Emil. Pelztierjagd und Pelzhandel. *Die Rohstoffe des Tierreichs*, 1, 416-522, 70 fig. Berlin, 1930. ISIS

Reviewed by ZAUNICK, *Mitteilungen zur Geschichte der Medizin*, 31, 35, 1932.

Buick, T. Lindsay. The mystery of the Moa. New Zealand's avian giant. XVI+357 p., front. New Plymouth, N. Z., AVERY and Sons, 1931. ISIS

Robin, Percy Ansell. Animal lore in English literature. IX+196 p., 8 pl. London, MURRAY, 1932. ISIS

Rowan, William. The riddle of migration. XIV+151 p. Baltimore, WILLIAMS and WILKINS, 1931. ISIS

Reviewed by E. W. MACBRIDE, *Nature*, 129, 561-62, 1932.

Schwangart, Friedrich. Stammesgeschichte, Rassenkunde und Zuchtsystem der Hauskatzen. 59 p., 10 fig. Leipzig, HEBER, 1929. ISIS

Shepherd, Odell. The lore of the unicorn. 312 p., front. London, ALLEN and UNWIN, 1930. ISIS

Tothill, John Douglas. The coconut moth in Fiji. A history of its control by means of parasites. By J. D. TOTHILL, assisted by T. H. C. TAYLOR and R. W. PAINE. VII+269 p., 34 pl. London, Imperial Bureau of Entomology, 1930. ISIS

Werth, E. Zur Abstammung des Hausesels. (Zur Geogr. u. Gesch. d. Kulturpfl. u. Haustiere, II.) *Sitzgsb. Ges. naturforsch. Freunde*, 342-55, 4 fig., Berlin, 1930. ISIS

Reviewed by ZAUNICK, *Mitteilungen zur Geschichte der Medizin*, 31, 35, 1932.

V. — SCIENCES OF THE EARTH

(Implying knowledge of both organic and inorganic nature)

31. — GEOGRAPHY AND OCEANOGRAPHY

Baker, J. N. L. A history of geographical discovery and exploration. 544 p., 51 figs., (Harrap's new geographical series ; general editor : R. N. RUDMOSE BROWN). London, HARRAP, 1931 (12s. 6d.). ISIS

Divided into two main parts : I. Before the nineteenth century; II. The nineteenth century and after, the second being somewhat longer than the first. This elaborate summary of modern exploration, filling an obvious gap, is very welcome. There are no less than 50 maps. G. S.

Marguet, F. Histoire générale de la navigation du XV^e^ au XX^e^ siècle. 306 p. Paris, Soc. d'Editions Géographiques, 1931. ISIS

Reviewed by E. G. R. TAYLOR, *Geographical Journal*, 79, 244, 1932. "This is the author's "Histoire de la longitude à la mer au XVIII^e^ siècle en France," rewritten and somewhat expanded under a new title." C. W. A.

(Royal Geographical Society). Reproductions of early engraved

maps. 2 : English County maps in the collection of the Royal Geographical Society. With introduction and notes by EDWARD HEAWOOD. II+14 p., atlas. London, Royal Geographical Society, 1932. ISIS

Thorade, Hermann. Probleme der Wasserwellen. VIII+220 p. Hamburg, GRAND, 1931. ISIS

Reviewed by D. J. MATTHEWS, *Geographical Journal*, 79, 148, 1932. "Bibliography from LEONARDO DA VINCI to 1930, with 329 references." C. W. A.

32. — GEOLOGY, MINERALOGY, PALAEONTOLOGY, MINING

(*For palaeobotany, palaeozoology and palaeoanthropology, see respectively* 28. *Botany*, 29. *Zoology and* 39. *Prehistory*)

Sparks, John B. The histomap of evolution. With foreword, bibliography, and recommended books. 12 p., chart. Chicago, RAND, MCNALLY, 1932 ($ 1.00). ISIS

This is an attempt to show in diagnostic colors in subparallel columns the sequence of events in the geological evolution of the earth, the palaeontological sequences of organisms, and the developments of human culture. Time in years progresses in a continuous logarithmic scale. Color and texture are utilized to indicate the component geological, organismal, and cultural elements whose emergence, increase, and decrease is indicated by the insertion and changing widths of the colored bands. The explanatory text fills these bands. C. A. K.

33. — METEOROLOGY, CLIMATOLOGY, AND TERRESTRIAL PHYSICS

Dept, Gaston Gérard. Quelques documents météorologiques inédits. *Revue des Questions scientifiques*, 460-73, Louvain, 1931. ISIS

Apropos of meteorological data included in chronicles, annals, and also after the discovery of printing in pamphlets. As far as Belgium is concerned a great many of these data have been published by E. VANDERLINDEN : Chronique des événements météorologiques en Belgique jusqu'en 1834 (Bruxelles 1924), but the author shows that that work is far from satisfactory. It needs correction in many respects, and there are in Belgian archives abundant sources which have not yet been exploited (many examples quoted). G. S.

Mitchell, A. Crichton. Chapters in the history of terrestrial magnetism. 1. On the directive property of a magnet in the earth's field and the origin of the nautical compass. *Terrestrial Magnetism and Atmospheric Electricity*, 105-46, 1932. ISIS

Elaborate survey referring to a very abundant literature (302 footnotes) and reaching the following conclusions (p. 130) :

" I. That while it is possible that the Chinese were acquainted with the directive property of a magnet by 1093 A.D., they made no further use of that property for at least two hundred years thereafter.

" II. That there is no evidence of the origin of any such knowledge among the Arabs, and it is improbable that they transmitted any information on the matter to Europe, their earliest mention of the compass being nearly half a century after its first mention in Europe.

" III. That the compass was in use in western Europe by 1187 A.D., and taking into consideration the fact that the directive property must have been discovered much earlier, it is most probable that a knowledge of that property and its application in western Europe was of independent origin and as early as, if not earlier than, that in China." G. S.

VI. — ANTHROPOLOGICAL AND HISTORICAL SCIENCES
(Knowledge of man, past and present)

37. — PSYCHOLOGY (*human and comparative*)

Myers, Charles S. The absurdity of any mind-body relation. 27 p. (L. T. Hobhouse Memorial Trust Lectures, no. 2). Oxford, University Press, 1932. ISIS

" Throughout life, directive activity, together with the associated, characteristic, mechanical activities, is synonymous with mental activity. The activities of what we artificially separate as living matter and mind are identical, each comprising the same directive and peculiar mechanical activities. There can be no mind-body *relation* in the presence of this *identity*. The only distinction that can be drawn is one between the living individual and individual objects of the lifeless universe."

38. — ARCHAEOLOGY (*generalities, methods*)

Faddegon, J. M. Notice sur les cauris. *Tijdschrift van het Kon. Ned. Genootschap voor Munt- en Penningkunde*, 13, 19 p., 1905. ISIS

Notice sur les coquilles utilisées comme monnaie. La *Cypraea moneta* se pêchait surtout aux îles Maldives et au golfe de Guinée; elle était utilisée dans la zone torride de l'ancien monde mais son usage a dû s'étendre beaucoup car on en a retrouvé dans les fouilles de Mésopotamie. G. S.

39. — PREHISTORY

Burkitt, Miles ; Childe, V. Gordon. A chronological table of prehistory. *Antiquity*, 6, 185-205, table, 4 maps, 1932. ISIS

Includes a large and most interesting synchronistic table divided into 28 columns relative to as many different regions, with index. G. S.

Ebert, Max. Reallexikon der Vorgeschichte. Unter Mitwirkung zahlreicher Fachgelehrter hrsg. Bd. I-XIV. Berlin, DE GRUYTER, 1924-1929. ISIS

Reviewed by HUBERT SCHMIDT, *OLZ*, 35, 100-03, 1932.

Marples, E. A. Ancient civilisations. *Transactions of the Newcomen Society*, 10, 69-85, 1929-30. ISIS

Sayce, A. H. The antiquity of civilized man. *Annual Report of the Smithsonian Institution* for 1931, p. 515-29, Washington, 1932. ISIS

The Huxley Memorial Lecture for 1930. Reprinted from the *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 60, July to December, 1930.

Vayson de Pradenne, A. Les fraudes en archéologie préhistorique, avec quelques exemples de comparaison en archéologie générale et sciences naturelles. 676 p., 46 pl., 40 fig. Paris, NOURRY, 1932. ISIS

La préhistoire, tout comme les sciences naturelles auxquelles elle se rattache, est fondée sur l'observation. On connaît les précautions qu'il convient de prendre pour bien observer; on connaît mal celles qu'il conviendrait de mettre en œuvre pour se protéger contre les risques d'erreur que peut introduire la volonté des hommes. Le préhistorien apporte un fait d'observation : la présence, dans des conditions déterminées, à un endroit précis, d'un objet. Mais une fois l'objet recueilli, le fait lui-même n'est plus observable. On n'a plus qu'un témoignage, qu'il est tout de suite grave de mettre en doute, tant le facteur psychologique est important. Aussi est-il plus nécessaire en préhistoire, en archéologie, que dans toute autre science, d'écrire une histoire des erreurs des archéologues, surtout quand celles-ci ont été déterminées par des fraudes.

Dans la première partie (577 p.) de l'ouvrage qu'il consacre aux fraudes, VAYSON DE PRADENNE passe en revue presque toutes les fraudes célèbres, depuis les iconolithes de Würtzburg (1725 et suivantes) jusqu'aux silex de l'île de Riou (1905-1907). Chaque exemple est traité en un chapitre spécial où l'aventure est exposée dans l'ordre chronologique des faits, où sont recherchées les caractéristiques psychologiques du fraudeur et de sa ou de ses victimes, et examinés les arguments du fraudeur et de la dupe, ainsi que ceux qu'emploient les dénonciateurs de la fraude.

Au reste, pour montrer le mode habituel d'évolution d'une fraude, VAYSON DE PRADENNE n'a pas limité son enquête à la préhistoire, mais a emprunté quelques cas à d'autres fraudes célèbres : les Moabitica (1872-1885), la tiare de Saitaphernes (1896-1903) les milliers d'autographes vendus à MICHEL CHASLES (1862-1870), etc., y sont étudiés suivant la même méthode que celle employée pour les fraudes en archéologie.

Dans la seconde partie de son ouvrage « Considérations d'ensemble sur les fraudes en archéologie préhistorique », l'auteur rassemble les traits généraux qui se dégagent de cette étude : le fraudeur et ses mobiles d'action, causes d'erreur de la dupe, argumentation des fraudeurs et des dupes, fin de la fraude. Il tire ensuite quelques conclusions pratiques sur les moyens de déceler la fraude et les moyens de faire reconnaître l'erreur.

Je considère comme éminemment utile l'histoire ainsi écrite par VAYSON DE PRADENNE, qui est d'ailleurs mêlé d'une façon très intime aux discussions qui se sont élevées autour des découvertes faites à Glozel dont il n'est pas ici question. Mais je souhaite qu'il ne se trouve pas d'esprit chagrin qui, après sa lecture, voie partout des faux ! L. G.

(**Wessex**). Map of Neolithic Wessex : showing the distribution of long barrows, circles, habitation sites, flint mines. Scale : 4 miles to 1 inch. Notes. 35 p. Southampton, Ordnance Survey Office, 1932. ISIS

40. — ETHNOLOGY (*primitive and popular science*)

Barbeau, Marius. Totem poles : a recent native art of the north-west coast of America. *Annual Report of the Smithsonian Institution* for 1931, p. 559-70, 6 pl., map, Washington, 1932. ISIS

Reprinted from the *Geographical Review*, 20, April, 1930.

Brunschvicg, Léon. Nouvelles études sur l'âme primitive. *Revue des Deux Mondes*, 172-202, juillet 1932. ISIS

A propos des travaux de L. LÉVY-BRUHL. J. P.

Mooney, James ; Olbrechts, Frans M. The Swimmer manuscript. Cherokee sacred formulas and medicinal prescriptions. XVII+319 p., 13 pl. (*Smithsonian Institution, Bureau of American Ethnology*, bulletin 99). Washington, Government Printing Office, 1932. ISIS

" Cherokee manuscripts and material on the Cherokee language have a most uncanny propensity to get lost. The ' dictionary ' of CHRISTIAN PRIBER has never been heard of since it reached Frederica, Ga., probably in 1741. The bulky material of the Rev. S. A. WORCESTER, including a grammar and a dictionary, went down on the *Arkansas* about 1830. The manuscript contributions to Cherokee linguistics by Col. W. H. THOMAS have ' unfortunately (been) mislaid.' The manuscript of JOHN PICKERING's grammar of the Cherokee language, the printing of which was interfered with, or was thought to have been interfered with, by the invention of the Sequoya syllabary, has never been found. To reach a climax : The manuscript which is edited in the following paper has been true to the tradition, and has disappeared without leaving a clue. The manuscript is described by MOONEY, who discovered it and brought it to Washington, as ' a small daybook of about 240 pages,... about half filled with writing in the Cherokee

characters,' and elsewhere as 'an unpaged blank book of 242 pages, 3½ by 12 inches, only partially filled; 137 (formulas) in all. MOONEY started work on it in 1888." (p. 1). After MOONEY's death, OLBRECHTS continued his work, the joint results of which are now published. An introductory chapter explains the special methods used by the investigators, then follows an elaborate account of Cherokee views on disease and therapeutics, and connected subjects: the medicine man, birth, views on pregnancy and its care, partus, care for child, raising a child to become a witch, twins, death and after life, etc. This first part (165 p.) is perhaps the most interesting for the student of primitive medicine. The second part containing the Cherokee texts with literal and free translation, and notes is also of considerable interest for the philologist. An important publication. G. S.

Weltfish, Gene. Preliminary classification of prehistoric southwestern basketry. 47 p., 19 fig. (*Smithsonian Miscellaneous Collection*, vol. 87, no. 7). Washington, D.C., 1932. ISIS

Wright, Jonathan. Medicine of primitive man. *Medical Life*, 39, 229-40; 243-94, portr.; 331-62; 383-422, illus.; 440-72, 1932. ISIS

41. — SUPERSTITION AND OCCULTISM

Penning, C. P. J. Iets over vampyrs. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 149-53, 1932. ISIS

44. — HISTORY OF CIVILIZATION

(*General history, historical methods, biography and chronology*)

Sartiaux, Félix. Qu'est-ce qu'une civilisation? Ses principales étapes. *Les Cahiers rationalistes*, 419-63, avril, 1932. ISIS

Spengler, Oswald. Der Mensch und die Technik. Beitrag zu einer Philosophie des Lebens. VIII+89 p. München, BECK, 1931. ISIS

Reviewed by Graf CARL v. KLINCKOWSTROEM, *Mitteilungen zur Gesch. der Medizin*, 31, 37-38, 1932.

46. — HISTORY OF LANGUAGE, WRITING AND LITERATURE

Hurtado, Juan; González Palencia, Ángel. Historia de la literatura española. Tercera edicion, corregida y aumentada. XVI+1140 p. Madrid, 1932 (30 pesetas). ISIS

The first edition of this elaborate history appeared in 1921, a second was already called for in 1925, and this is the third, corrected and increased.

One of the authors (the second) is well known to our readers for his great work on the Mozarabs of Toledo (4 vols., Madrid, 1926-30), the subject of a long review (*Isis*, 15, 183-87) which includes also brief bio- and bibliographical notes about himself. (See also *Isis*, 17, 501). Thanks to his cooperation we may depend on it that this history pays sufficient attention to the Arabic contacts and influences. He has published independently a history of Hispano-Arabic literature (Historia de la literatura arábigo-española, Barcelona, Editorial Labor, 1928) and the present work contains introductory chapters dealing with Hispano-Latin, Hispano-Jewish, and Hispano-Arabic literature. There are abundant bibliographical notes and a full index. G. S.

Sprengling, Martin. The alphabet : its rise and development from the Sinai inscriptions. 71 p., 4 pl. Chicago, University Press, 1931. ISIS

Reviewed by FLINDERS PETRIE, *Antiquity*, 6, 375, 1932.

49. — HISTORY OF RELIGION
(*Science and religion*)

Miner, John R. Church membership and commitments of prisoners. *Human Biology*, 3, 429-36, 1931. ISIS

Miner, John R. The churches and social well being. *Human Biology*, 4, 421-28, 2 fig., 1932. ISIS

Pearl, Raymond. Some notes on the census of religious bodies, 1926. *Journal of Social Psychology*, 11, 417-32, 1931. ISIS

Schmidt, P. Wilhelm. Handbuch der vergleichenden Religionsgeschichte zum Gebrauch für Vorlesungen an Universitäten, Seminaren usw. und zum Selbststudium. Ursprung und Werden der Religion, Theorien und Tatsachen. XV+296 p. Münster, ASCHENDORFF, 1930. ISIS

Reviewed by A. ALLGEIER, *OLZ*, 35, 385-88, 1932.

Sharenkoff, Victor N. A study of Manichaeism in Bulgaria, with special reference to the Bogomils. XXV+85 p. New York, CARRANZA, 1927. ISIS

Reviewed by E. BENVENISTE, *Journal asiatique*, 218, 378, 1931.

VII. — MEDICINE

50. — HISTORY, ORGANIZATION, AND PHILOSOPHY OF MEDICINE

Andel, M. A. van. De aderlating in theorie en practijk. I. De humoraal-pathologie. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 181-201, 4 fig., 1932. ISIS

Andel, M. A. van. Kwakzalversadvertenties in oude couranten. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 141-49, 1932. ISIS

Aperlo, G. Medaglie coniate in onore di anatomici, medici, chirurghi, specialisti italiani dei secoli XVIII, XIX, e XX. (Contributo alla storia icono-biografica della medicina). *Rivista di Storia delle Scienze Mediche e Naturali*, 23, 84-86, 117-28, ill., 1932. ISIS

GIORGIO BAGLIVI (1668-1707); CARLO BOTTA (1766-1837); ENRICO BOTTINI (1838-1903); ANTONIO COCCHI (1695-1758); GIOV. PIETRO FRANK (1745-1821); GIUSEPPE FRANK (figlio) (1771-1842); LUIGI GALVANI (1737-1798); CAMILLO GOLGI (1843-1926); EDOARDO GRANDI (1849-1912); GIUSEPPE LAPPONI (1851-1906); GAETANO MAZZONI (1854-1922); ANTONIO CARLO LORENZUTTI (1806-1867).

Bakker, C. De geneeskunst der oude Arische volken. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 21-38, 1932. ISIS

Barach, Joseph H. Entelechy and scientific determinism in medicine. *Annals of Medical History*, 4, 474-86, 1932. ISIS

Diamare, V. Documenti cassinesi di medici del XVII e XVIII secolo. 1. Delle " Separationi " lettera di GIUSEPPE ZAMBECCARI. 2. GIOVANNI GIACOBBE FERIA, medico di Lovanio (Bruxelles, 30 agosto 1664). *Revista di Storia delle Scienze Mediche e Naturali*, 23, 49-68, 97-108, 1932. ISIS

Goulard, Roger. Médecins et chirurgiens embastillés pour libelles. *Bulletin de la Société française d'histoire de la médecine*, 26, 211-17, 1932. ISIS

Larsell, O. An outline of the history of medicine in the Pacific Northwest. *Northwest Medicine*, 31, 390-96, 437-43, 483-89, 10 figs., 1932. ISIS

51. — EPIDEMIOLOGY, HISTORY OF SPECIAL DISEASES. PUBLIC HEALTH AND SOCIAL MEDICINE

Andel, M. A. van. De chirurgijn in dienst der justitie. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 90-94, 1932.

Doninck, A. van. Gezinsverpleging in vroegere tijden te Gheel, de duivelbanning. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 85-90, 4 fig., 1932. ISIS

Faucci, Ugo. Contributo alla storia della scabbia. *Rivista di Storia delle Scienze Mediche e Naturali*, 22, 153-69, 198-215, 257-371, 441-75, 1931. ISIS

(Gonorrhea). Gonorrhea number I. Readings in the history of gonorrhea. *Medical Life*, 39, 475-524, 1932. ISIS

Papers by L. LEMONNIER (1689), COSTE, JR. (1769); F. SWEDIAUR (1805), ALBERT NEISSER (1879, 1882), and ARPAD BOKAI (1880).

(Gonorrhea). Gonorrhea number II. Readings in the history of gonorrhea. *Medical Life*, 39, 527-88, 1932. ISIS

Papers by MAX BOCKHART (1883), K. S. F. CREDÉ (1884), ALBERT NEISSER (1884, 1885 and 1890), H. C. J. GRAM (1884), ERNST BUMM (1887), ERNST WERTHEIM (1892), and KARL MENGE (1893).

Greenwood, Major. Epidemiology historical and experimental. x+ 80 p., 5 figs. (The Herter lectures for 1931). Baltimore, Johns Hopkins Press, 1932 ($ 1.50). ISIS

The first of the three Herter lectures for 1931 before Johns Hopkins University, published in slightly expanded form, presents a historical survey in the field from the Hippocratic School to modern statistical and mathematical epidemiology as exemplified in ROSS and BROWNLEE. The second and third lectures critically review more recent studies. The inductive method of studying herd sickness was outlined by HIPPOCRATES, but no record of its use survives. GALEN's epidemiological doctrine is both logical and consistent. He postulates the interplay of three factors : (a) an atmospheric one, the katastasis; (b) an internal one, the crasis; and (c) a predisposing one, or procatarctic, or respectively the specific factor, natural susceptibility, and the predisposing factors. The last two determine the severity of the epidemic. Except for GALEN's inability to analyse his katastasis, his doctrine is essentially modern. The principle of contagium vivum proposed by FRACASTORIUS differed from that of the Greeks and Arabs in that it involved the idea of an organism reproducing itself; but he did not maintain that the infective principle was an essential link in the chain of epidemiological causation and his idea exerted little influence. BALLONIUS (1640) tried to do in Paris what HIPPOCRATES did on the island of Thasos, but his pioneer work is overshadowed by that of SYDENHAM, who rejected GALEN's doctrine, retaining

only his atmospheric factor divested of all meteorological aspects. His development of the idea of diversity of effluvia as related to epidemics was unfruitful, but his emphasis upon epidemic succession was of value. GRAUNT (1662), a London tradesman, is the father of vital statistics, though not even cited by HAESER. HENLE's essay (1840) on *Miasmen und Kontagien* was epoch making. It described herd sickness as a biological phenomenon with a cyclic aspect. This is comparable to PASTEUR's exhaustion theory of immunity, for which BROWNLEE sought a mathematical expression. The rise of the bacteriological school swept away all prior conceptions of epidemiology, but HENLE's essay stimulated FARR to develop vital statistics and RONALD ROSS and BROWNLEE, equipped with modern tools, have continued the work. Chapters two and three are concerned with investigations of herd sickness in mice and studies of the relative importance of selective mortality and active immunization in virus and bacterial diseases.

C. A. K.

Mengert, William F. The origin of the male midwife. *Annals of Medical History*, 4, 453-65, 9 fig., 1932. ISIS

Montgomery, Douglass W. The historical position of coccidioides immitis among the pathogenic fungi of the skin. *Annals of Medical History*, 4, 199-202, 1932. ISIS

Pagel, W. Geschichte des runden Magengeschwürs. Beiträge zur historischen Pathologie und zur Geschichte der Diagnose I. *Sudhoffs Archiv für Geschichte der Medizin*, 25, 330-48, 1932. ISIS

Tricot-Royer, Dr. Les saints protecteurs des lépreux. *Bulletin de la Société française d'histoire de la médecine*, 26, 245-48, 1932. ISIS

Zimmerman, Leo M.; Howell, Katharine, M. History of blood transfusion. *Annals of Medical History*, 4, 415-33, 12 fig., frontisp., 1932. ISIS

52. — HISTORY OF HOSPITALS, OF MEDICAL TEACHING, AND OF THE MEDICAL PROFESSION

(British Medical Association). History of the British Medical Association, 1832-1932. Compiled by ERNEST MUIRHEAD LITTLE. VIII+342 p., 29 pl. London, British Medical Association, 1932. ISIS

Hellinga, G. Het Amsterdamsche dol- of krankzinnigenhuis. *Bijdragen tot de geschiedenis der geneeskunde*, 12, 61-78, 7 fig., 1932. ISIS

53. — PHARMACY. PHARMACOLOGY. TOXICOLOGY.

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VIII. — EDUCATION

(The methods of accumulating, imparting and diffusing knowledge)

54. — EDUCATION

(*Generalities, methods, colleges, universities*)

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56. — BIBLIOGRAPHY

(*Methods, libraries*)

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This note is published at the end of our bibliography solely for the convenience of the scholars who cut the whole or part of it, attach extracts to catalogue cards and classify them. By adding this note to the others they will be able to find out rapidly whether this particular bibliography has been analyzed or not. G. S.

59. — ERRATA. Series 27.

(*For previous errata, see* Isis, XIX, 461.

Vol. 18, 387, 2nd note, l. 4 : read OLDHAM, not ODLING.

Vol. 18, 412, l. 2 : for GASH, read GASK.

SARTON's *Introduction to the History of Science*, vol. II. P. 1177, Globes, Arabic and Globes, celestial, add 1014-15.

A few other misprints are not mentioned in these errata because they are too obvious to cause any error or confusion. I wish to express my thankfulness to the readers who take the trouble to make the above-mentioned corrections in their set of *Isis* and the *Introduction*. I would advise them, after having accomplished that little task, to write their initials near mine at the bottom of this note to indicate that these and the previous errata have been taken into account.

G. S.

These and the previous errata have been corrected by...

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The Roman figures followed by (1) or (2) refer to the centurial classification (Part I). Thus, Artelt, XVI (2) D means that a paper by Artelt is listed under XVIth century, second half, subdivision D.

The Arabic figures refer to the historical and to the systematic classifications (Parts II and III) which are subdivided in sections numbered consecutively from 1 to 59. For instance, Darmstaedter, 6, 28, indicates that papers by Darmstaedter are listed in section 6 (Middle Ages), and in section 28 (botany).

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